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SHAWSHEEN WATER SUPPLY.

HEARING

BEFORE

Committee on Water Supply and Drainage,

MASSACHUSETTS LEGISLATURE,

1883.

A. J. BAILEY, Esq., For City of Boston.

J. W. HAMMOND, Esq., For City of Cambridge.

E. P. BROWN, Esq.,

GEORGE H. POOR, Esq., } For the Town of Andover.

Hon. R. M. MORSE, Jr., For the Smith & Dove M'f'g Co.

WM. G. RUSSELL, Esq., } For J. Putnam Bradlee, Proprietor
J. R. BULLARD, Esq., } of Ballardvale Mills.

GEORGE H. POOR, Esq., { For Moses T. Stevens, Esq.,
Proprietor Marland Mills.

BOSTON:

PRESS OF ROCKWELL AND CHURCHILL, No. 39 ARCH STREET.

1883.

Andover Room

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MEMBERS OF COMMITTEE.

SENATE:

ALLEN, OF PLYMOUTH,
WELLS, OF MIDDLESEX,
McGEOUGH, OF SUFFOLK.

HOUSE:

CAMPBELL, OF BOSTON,
SMITH, OF ANDOVER,
BIRD, OF NATICK,
KINGSLEY, OF CAMBRIDGE,
WHITIN, OF NORTHBRIDGE,
FOSTER, OF MEDFORD,
SAYWARD, OF BOSTON,
McLAUGHLIN, OF BOSTON.

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HEARING.

GEORGE H. POOR, Esq. — The town of Andover comes here under vote passed at its annual meeting, March, 1882, which vote I will read: "Voted to appropriate the sum of \$500, to be expended by the Committee on Reservoirs, in making surveys, computations, and application to the Legislature for a charter to take water from ponds and streams within the limits of the town."

This subject of a water supply for the town of Andover is not altogether new. In 1878, at the annual meeting, it was voted, "That committee of five be appointed by the Chair, to take the whole subject of reservoirs into consideration," etc. The Chair appointed Messrs. Johnson, Jenkins, Taylor, Flint, and Smith. In 1879, at the annual meeting, March 3d, it was voted to appropriate the sum of \$100, and expend the same in further experiment on a water supply for fire purposes.

On March 1, 1880, it was voted to appropriate \$50, asked for by the committee. At a special meeting, held February 14, 1881, it was voted to oppose the petitions of the city of Boston and Cambridge, to take water from the Shawsheen river. February 13, 1882, further remonstrance was adopted at a special meeting against the petitions pending that year for taking water from the Shawsheen river. A committee was appointed, which committee is still in power, to oppose the petitions of Boston and Cambridge. At an annual meeting, March 6, 1882, as I read before, it was voted to appropriate \$500, for surveys, and to apply to the General Court for a charter to take water.

At a special meeting held on the 20th of January, 1883, an article was inserted in the warrant to see if the town would authorize the committee appointed in 1882 to employ counsel and expend money in opposing said petitions; and it was voted to appropriate \$1,000 for that purpose.

Now, gentlemen, I suppose it is incumbent upon the town of Andover to show you why they need the water, and where they may get it. We have here certain of our citizens, whom I shall call presently, and we will show you what these needs are.

Andover is a town of about 5,000 to 5,500 inhabitants, with a large proportion of houses to its inhabitants. Almost every house

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has a well in the enclosure. There is no public water supply, and no drainage or sewerage system in the town. For many years we have felt that our wells were becoming contaminated, and great trouble has arisen from that source; sickness has ensued in many cases, and great complaint of the inability of our wells to give an adequate supply of water exists among our people. It has been a matter of common remark for many years that we must soon do something for a water supply. There have been many houses built within a few years past, and we are building every year a very considerable number, whereby the danger of contamination to our wells is becoming greater; therefore we feel that we have got to resort to some other source than our wells for an adequate supply of water.

The CHAIRMAN. — Mr. Poor, we understand that this evidence all to be taken down and is to be printed?

A. Yes, sir.

Q. The matter which you propose to offer is the same as has already been presented to committees in years past?

A. No, sir; not exactly.

Many of our wells get dry in summer, and in extraordinarily dry seasons more of them are dry, which is an additional reason why we should have an adequate supply of pure water. Again, we have no protection against fire in the town other than that afforded by a few reservoirs situated about the village. Any one of these reservoirs can be pumped dry by an engine in half an hour. Our houses are almost entirely built of wood. We are exposed at all times to conflagration, and are very fortunate that we have not had our whole village swept away in dry seasons. We have in Andover a considerable number of public buildings, and they could not be replaced for any moderate sum of money. There is a great deal of money invested in them, and there is no protection for them in the way of water. We have a steam fire-engine, and this past year we built a house for it, at an expense of \$10,000, but there is no water for it; therefore we think it is absolutely necessary that we should have a supply of water from some source. This subject is not a new one with our people; they have considered it for the last five years. We have had surveys and estimates made by a competent engineer, and I have here a plan, which I will present to you. It shows that we can most readily, most economically and best, take water from Shawsheen river, which is a stream having its head waters in Lexington, Burlington, and Bedford, running down through Bellerica, Tewksbury, and Andover, to the Merrimack. The stream flows through Andover in a northerly direction. Where we propose to take the water is at a point in the valley below Ballardvale, and the point nearest where we propose to have a stand-pipe.

[Mr. Poor here presents a map of the town of Andover in 1852, which he explains to the committee.]

You will observe that the stream runs down through the thickly-settled portion of the town. The district it is proposed to supply with water is indicated by the blue line, — that gives the outline of the stream and the settlements along its banks.

[View of town of Andover, 1882, shown to the committee, and explained by Mr. Poor.]

That is the centre of the town; *here* is the point on the river where we propose taking the water, carrying it up *that* street to the stand-pipe in the rear of the Theological Seminary. That stand-pipe is three hundred and fifteen feet above the level of the sea, and one hundred and seventy-five feet above the level of the street in front of the Town-house. We purpose to take it down Main street, School street, and some of these side streets, and, in general, to supply the village. We think that three thousand of our population could be supplied by that plan; they are the very portion suffering most for the need of pure water, and we find that we can do it at a comparatively small expense for a town of our resources. While there are other sources of water supply in town, there are none so near, or in which the water is so good, if we can believe the testimony taken last year and the year before. The point where we would take the water is that nearest to our proposed reservoir, and I can give you the exact number of feet, — it is five thousand five hundred feet from the river to the stand-pipe.

I do not know as I need say anything more in the way of opening the case, and I will proceed to call the witnesses.

SAMUEL K. JOHNSON.

MR. POOR. — You are a resident of the town of Andover, are you not?

A. Yes, sir.

Q. You are the chairman of the Committee on Water Supply and Drainage?

A. Yes, sir.

Q. Please state to the committee the needs of the town, as you look at them; state the facts and your own opinion, without regard to the opinion of others, giving your own knowledge and opinion.

A. I am one of the Committee on Water Supply and Drainage, and we have been at work for the last five years to find a supply of water, and have been unable to find anything to our satisfaction. We recommended the town to give us an appropriation to come to

the Legislature for authority to secure a water supply for our town. We did not know where else to get this authority, and have no other way but by this petition. Our wells are becoming contaminated; the supply is short, — our wells, many of them, are dry at the present time. The town has taken this action because they need the water; we are without any protection whatever in case of fire. The property belonging to the town is valued at over \$200,000. We have reservoirs. When the brook is running it would be a supply to our other reservoirs, but they could be pumped dry in half an hour; those reservoirs are not adapted for steam fire-engines. The town has been at work, and is at work, to find an adequate supply of water. As I said before, we have reservoirs, but they do not reach the needs of the town. We proposed using the reservoir which is now in the rear of the Theological Seminary, which could have been made to suit our fire purposes at a reasonable cost, and where we found there was an ample supply of water; but the result was that they needed the water themselves. Last spring we came to the town and reported the condition of things after five years' labor: that we must have some water, and the only way was to petition the Legislature to allow us to take water from the Shawsheen river at any point or points of the stream within the limits of the town. They authorized us to go to the Legislature, and gave us \$500 to employ an engineer to make plans, estimates, etc., etc.

My own belief is that something must be done, and that soon; and I think the rest of the committee will agree with me. If we take the water from the river from Haggett's Pond, it is too low; and Pomp's Pond is a mile and a half away, — that is the nearest point, and it is only part and parcel of the Shawsheen river; we might as well go to the river at once, and save our distance.

Q. Isn't Pomp's pond a shallow, muddy pond?

A. Yes, sir.

Q. By that experiment of yours on the hill, you state you find the supply would be sufficient, — you mean for the lower part of the town?

A. Yes, sir.

Q. What is the area of this little pond?

A. Two acres; it would be sufficient for fire purposes only to protect our public buildings.

Q. Is there not a complaint in Andover about the bad water in the wells?

A. I think there is. I heard a man say that a neighbor could not use his well, as the water was so bad.

Q. In your immediate vicinity have the wells been dry?

A. Mine, both of them, have been dry, and I had to go to the river for water and draw it for two months.

A COMMITTEEMAN. — This scheme which you have worked up contemplates a new system of drainage, I suppose?

A. We have not yet got into that, and will only consider it when we have the water.

The CHAIRMAN. — Does it occur to you that this subject of drainage is the most important matter in connection with water?

A. We propose to have drainage.

Q. What is the character of the land from that point to the Merri-mack?

A. It is low.

Q. Is the soil at all sandy or gravelly, do you know?

A. I think not; it is meadow land.

Mr. BAILEY. — I understand you propose to take the water from the valley at a point below the Ballardvale Flannel Mills?

A. I don't know, sir; I have no experience in the matter.

Q. What is this Haggett's Pond?

A. It is a pond half-way between Andover and Lowell.

Q. What is its area?

A. Two hundred and twenty acres.

Q. Is there any considerable amount of water flowing from it?

A. Not much.

Q. What is the exact distance from Andover to that pond?

A. Our engineer will tell you; he has measured it; we think it is too far and too expensive.

Mr. HAMMOND. — You say a committee was appointed five years ago?

A. I believe so.

Q. Were you one of the committee?

A. I was.

Q. What was the vote of your town?

A. That a committee of five be appointed to take the matter into consideration.

[Vote read by Mr. Hammond.]

Q. What was that reservoir for?

A. To protect those buildings.

Q. Was the water put there?

A. It was not; we expected that we should get the privilege from the trustees to use that water.

Q. Did you get that permission?

A. No, sir; we got permission to test it; then they wanted it.

Q. Now, that vote on the face of it appears to concern simply the

reservoirs by those two school-houses. Was anything else discussed?

A. The reservoir was of no account ; for pumping by steam-engines it was of no avail.

Q. What reservoir was the town going to give you the use of?

A. The one behind the seminary.

A COMMITTEEMAN. — What was the area of that pond?

A. It was eight feet deep, and covered two acres of ground.

Mr. HAMMOND. — In March, 1879, \$100 was voted to be expended. Was that money expended?

A. No, sir.

Q. What do you mean by testing the reservoir?

A. To see how much water it held in the dry season.

Q. How did you test it?

A. We tested it by measuring it.

Q. You mean how much would go into it in the dry season?

A. No, sir ; how much it would hold in the dry season.

Q. Let me ask you whether you think or not that the petition now made by the town of Andover to take certain water has been at all influenced by the consideration that somebody else is trying to get the water of the Shawsheen?

A. I can say for myself that I have been using my influence to try to get this charter.

Q. Were you present at the meeting when this matter was discussed?

A. Yes, sir.

Q. Was anything said that they had to do it to effectually oppose the petitions of Boston and Cambridge?

A. I do not think so.

Q. Then, in all the discussions you have not heard it urged that it would be a good way to oppose other parties from taking water from the Shawsheen river?

A. I cannot tell you.

Q. You cannot tell whether you ever heard the question discussed in connection with the application of Boston and Cambridge to take the water of the Shawsheen?

A. I suppose I have ; but I cannot say whether I have or not.

Q. How many acres do you propose to supply?

A. We propose to supply this village, as you see it on this map.

Q. Can you give me the number of acres?

A. No, sir.

Q. Can you tell me what percentage of the town it is?

A. I cannot give you the percentage or the number of acres.

Q. What is your plan now?

A. The plan is laid out. Our plan is to get a charter to take the water from the Shawsheen river; but we want this charter to cover all the streams and ponds through the town.

Q. When you get that charter, do you know what you are going to do?

A. We think we do. It is to get the water from the Shawsheen river.

Q. From what point?

A. The plan shows you below Ballardvale mills, two and one-half miles, and pumping it on to Seminary Hill, and distribute it from there.

Q. Do you consider the water pure enough?

A. I think it is.

Q. Is there not a good deal of filth going into the Shawsheen river from Andover?

A. Somebody else must answer that. The water has been analyzed.

Mr. POOR. — Your plan contemplates a filter, does it not?

A. Yes, sir.

Mr. HAMMOND. — Although you have been chairman of this committee for five years, you have taken no means to ascertain whether this water is pure enough from where you propose to take it?

A. I cannot say as to that. If you give us a charter, we may take it from above Bradlee's mills. I understand it is exceptionally pure water. It has been analyzed; but I have not analyzed it.

Q. Why do you desire to take the rest of the ponds?

A. We want to take what belongs to us.

Q. You propose now to get from the Legislature the right to take from the town of Andover every drop of public water that comes into the town limits?

A. We want a charter to take all we can get.

Q. Have you any plan by which you propose to utilize every source of water in the town?

A. We propose to take what we can get.

Q. You propose to get a roving charter, to give you the right to go where you please about the town?

A. We do not propose to go out of the town.

Q. And you are not certain in your own mind that you will need to take the water from the Shawsheen, are you?

A. We have not decided where we will take it.

The CHAIRMAN. — Has an estimate been made of the cost to the town of Andover to bring this water to it?

A. Yes, sir; \$67,000. The engineer will give you the details.

DR. J. F. RICHARDS.

Mr. POOR.—You are a physician practising in the town of Andover?

A. I am.

Q. Will you state to the committee the reasons why you think Andover should have a supply of pure water?

A. The wells are insufficient in the summer time to supply the families, and insufficient to supply the need for sewerage purposes. The water is not good in quality. It is uniformly hard water. I know of no well that furnishes what is called "soft water." Again, it is in repeated instances contaminated by matter which ought to pass away in the sewage, and frequently bad-flavored, apparently, from that cause.

Q. Do you think the public health is in danger?

A. I think, on general principles, it is. There is no public measure which will conduce more to the hygienic condition of the central part of the town than good water.

The CHAIRMAN.—Have you in mind any means of disposing of the sewage?

A. I have not posted myself on that question. I do not know what the plans are.

Q. You think, however, that there ought to be a plan of sewerage?

A. I do, sir.

A COMMITTEEMAN.—There have been no epidemics, have there?

A. No, sir; but I have seen individual cases of sickness.

Q. If the town should get the right to introduce this water, should you urge upon them at once the consideration of a proper system of drainage?

A. I should urge its being adopted as soon as could be.

Q. And you would turn that sewage into the stream?

A. I know of no other way to dispose of it.

Q. You think for the town of Andover that is desirable?

A. I think so.

Q. From your knowledge do you think that if a great flow were taken from that stream there would be sufficient flow left?

A. From what information I have I should say that the water of a running stream purifies itself soon after the entrance of foul matter into it.

Q. And you think that the sewage of a town the size of Andover should be emptied into the Shawsheen?

A. I cannot say definitely as to that.

Q. From your knowledge do you think that if a great deal of water were taken from that stream there would be sufficient flow left to discharge itself into the Merrimack?

A. I should think not.

Mr. BAILEY. — What do you think the result would be after discharging foul matter into the Shawsheen river during the dry season?

A. I should say that when the water is low in the dry season, any contamination of it would not be desirable.

DR. JOHN C. PENNINGTON.

Mr. POOR. — Will you state such reasons as occur to you why Andover should have a water supply?

A. I cannot say anything except in corroboration of Dr. Richards. In regard to the sewerage system, I think it is of the utmost importance. A great many of the houses are made in the country fashion, and have privies. In the summer time the matter is absorbed by the ground, and in the winter it overflows, and the ground becomes covered with dirt; and in the summer time the ground becomes covered with a reeking mass of matter, which ought to be carried away, and I think that a perfect system of drainage ought to be established for the sanitary condition of the town.

Q. You know, from your experience there as a physician, that many of the wells are contaminated, or bad?

A. I do.

The CHAIRMAN. — How would you have the sewage?

A. Carried to the Shawsheen river.

Q. Do you consider it safe for the Commonwealth to authorize such a course?

A. I am not an engineer; but I think there are very few houses below Andover on the Shawsheen to where it flows into the Merrimack, and I do not think that conducting the sewage into the Shawsheen could be productive of any appreciable harm to health.

A COMMITTEEMAN. — Do you know the minimum quantity of water that passes through the Shawsheen in the dry season?

A. I do not.

Q. Have you ever heard of, or looked into, any other method of disposing of sewage except by conducting it into the water-course?

A. No, sir.

Q. In regard to the nature of the soil on which Andover is built?

A. I cannot speak positively about that. I think there is a good deal of gravel there.

Q. Is it not of a marshy nature?

A. It used to be marshy some years ago. The cause of the change I cannot understand; but there is some marsh there still.

Q. It is a farming country around Andover, is it not?

A. Yes, sir.

Mr. POOR. — In regard to the Shawsheen below Frye Village, — I will say Frye Village is the last settlement below Andover, — there is not a house on the stream for three miles, and only one in four miles, so that any sewage which we might empty into the Shawsheen river would have ample opportunity to purify itself. As the water goes down from the mills it stirs it up and moves it along. There is no one to be offended. There is no obstruction below Frye Village.

WILLIAM S. JENKINS.

Mr. POOR. — You are a resident of Andover, are you not?

A. I am.

Q. You have been a selectman of the town in times past?

A. I have.

Q. You are one of the Committee on Water Supply and Drainage, are you not?

A. I am.

Q. State to the committee the needs of Andover, with reference to pure water.

A. The needs of Andover — that is, the thickly settled part of Andover — for pure water are very great.

Q. You are President of the Merrimack Insurance Co., are you not?

A. I am.

Q. What is your action, as a business-man and prudent manager, with reference to buildings in the centre of the town?

A. We act very cautiously in placing our risks in certain portions of the town, on account of the insufficiency of the water supply. We do not take risks in the central part of the town, from the fact that, should a fire originate there, there is no water there with which we could put out the fire. It is true they have a steamer there; but it is of no use without water.

Q. Is it not a fact that you have cancelled policies in the immediate vicinity of the square?

A. It is; on the ground of insufficiency of water.

Mr. HAMMOND. — Are you one of this committee?

A. I am.

Q. And have been for how long?

A. Five years, I understand from the data.

Q. If you get power to take water from the Shawsheen, are you at all certain in your mind that you will use it?

A. Why, yes, sir.

Q. If you get power to take other brooks and streams of the town, are you certain that you will use them?

A. Not certain that we would from all the ponds.

Q. Why do you make application to take it from all the ponds and streams?

A. In order that we may take our choice.

Q. Do you think it feasible to take the whole?

A. We do not want the whole.

Q. Why do you ask for the whole?

A. We ask any.

Q. That means to take your choice?

A. To take our choice; to take from the nearest point to the Shawsheen.

Q. Why do you want a bill that should give you your choice, when you are now ready to settle it?

The CHAIRMAN. — The committee will state that it is the same as any other petition that comes before it.

Mr. BAILEY. — I understand you that your committee has now decided upon the point you have indicated nearest to the Shawsheen river?

A. Yes, sir.

Mr. POOR. — Do you think the town would take the Shawsheen-river water?

A. I do.

COL. GEORGE RIPLEY.

Mr. POOR. — You would testify the same as others as to the need of water for the town of Andover?

A. I should.

Q. Whether or not, in your judgment, the town would take the Shawsheen-river water?

A. I have no doubt but that they will.

JOHN L. SMITH.

Mr. POOR. — You are one of this committee of the town?

A. I am.

Q. What are the needs of Andover for water for fires? Have you an adequate supply of water?

A. In the summer time we have not half our supply from our reservoirs.

Q. Would any of them, to-day, except the one on Rogers' brook, hold out half an hour under a draught from the steamer?

A. I doubt if they would hold out half an hour.

CHARLES H. LITTLEFIELD.

Mr. POOR. — You are a civil engineer, residing in Lawrence, are you not?

A. Yes, sir.

Q. Have you made a survey and plan for Andover?

A. Yes, sir.

Q. Please explain the plan.

A. The plan is simply to take the water from the Shawsheen river from the point indicated, which is between Ballardvale and the upper village dam, in Andover; pump the water into a tank on the hill in the rear of the seminary, in Andover. That is the simple scheme.

Q. And is that the best practicable scheme?

A. I think it is.

Q. And have you investigated other schemes?

A. I have investigated Pomp's Pond and Haggett's Pond, and find them entirely inadequate.

Q. Have you investigated the quantities of water they contained?

A. No, sir.

Q. What do you say about the quality of the water, — whether it is hard or soft?

A. I believe it is soft, from a report I have read.

Q. Have you that report?

A. It is contained in Shed and Sawyer's preliminary report, made for the city of Lowell; I have forgotten the date. I think it was in '66 or '69.

Q. Is it not a fact that Haggett's Pond is too remote to make it an economic supply?

A. I should consider it so, and there is not water enough there.

Q. Haggett's pond is very low, is it not?

A. It is higher than the river.

The CHAIRMAN. — What height would you have to pump water from the Shawsheen river?

A. About two hundred and sixty feet.

Mr. POOR. — Did your investigation of Pomp's Pond lead you to regard that as a feasible source of supply?

A. It did not; there is a brook which connects it with the river. The pond is further off, and would have to have a longer supply-pipe.

Q. What is your estimate for supplying Andover with water from the Shawsheen river?

A. \$66,248.

Q. What does that cover?

A. That covers the engine and house, pipes and tank, mains and distributing-pipes.

Q. Covers all that is contained upon the plan, together with a proportionate number of hydrants?

A. Covers everything for putting the works in a condition to run.

Q. What is the character of the soil?

A. The streets are ordinarily gravel and clay stuff. I made no investigation; but the people of the town told me that there was no ledge, or very little ledge would be found.

Mr. BAILEY. — The height is two hundred and sixty feet?

A. Yes, sir.

Q. What is the height from Haggett's Pond?

A. Haggett's pond is sixty-three feet higher than the river.

Q. What is the distance to the river?

A. I was told it was four miles.

Q. That water is good water, is it not?

A. I believe it is.

Q. Do you know anything about the soil between Haggett's pond and the river?

A. I do not.

Q. What would be the expense of laying a pipe from Haggett's Pond to the river?

A. I have made no definite estimate on that.

Q. What is the size of the pipe that would be laid?

A. Ten-inch pipe.

Q. What is the cost of ten-inch pipe of the kind you would lay there?

A. \$1.85.

Q. Four miles, then, would cost about \$40,000 for that pipe alone?

A. Yes, sir.

Q. Any high land between Andover and Haggett's Pond suitable for a reservoir?

A. I did not look at that.

A COMMITTEEMAN. — What do you estimate would be the cost of conducting water from the river to the reservoir?

A. That is not a matter of construction; it is every-day work.

Q. Have you formed any estimate of it?

A. Not an accurate estimate; I could not do that without looking up some matters.

Mr. HAMMOND. — When were you requested to look up these matters?

A. About a year ago.

Q. Had any estimates been made before that time?

A. Not for domestic purposes.

Q. Are you a resident of Andover?

A. No, sir.

Q. Are you familiar with Ballardvale?

A. I have been there.

Q. What is the population?

A. I do not know.

A COMMITTEEMAN. — Has your survey extended so far that you could tell whether it would be feasible to take the water above Ballardvale instead of below, if the water were found to be impure?

A. There would be the additional expense of carrying the pipes to the pumping machinery.

Mr. HAMMOND. — Do you intend to have one pump, or duplicate pumps?

A. My report only provided for one pump.

Q. As an engineer, advising a town on the construction of water-works, would you advise them to have one or two pumps?

A. In constructing the works one pump might do for a short time, but finally they would need two pumps. The works are apt to increase, and they would have to provide for an additional pump.

Q. As an engineer, would you rely on that?

A. Not a great while.

Q. Is it your idea to pump every day?

A. Yes, if the water is needed; the reservoir, I propose, would hold two or three days' supply.

Q. Does your estimate include the construction of a filter?

A. Yes, sir.

Q. Have you made such investigation as satisfies your mind that there are many days that it would be impracticable to pump on account of the size of the stream?

A. I do not think there is any question but that it would be practicable to pump every day in the year.

Q. Have you made any investigations as to the purity of the water?

A. I have made no investigation of the purity of the water at any time.

Q. Although Ballardvale drains into it, and although in the summer time the stream is very low, would there, at any time, be a time when it would not be safe to pump into that reservoir?

A. I have no doubt of it.

Q. Have you examined that question?

A. I have not examined the river.

Q. Considering the responsibilities that would rest upon you as an engineer advising a town in the construction of water-works, would

you say to this committee that you had made such an investigation?

A. I say that I have not made such investigations.

Q. Have you made such as would justify you in telling the town that thing?

A. I have no doubt about it. I have made no experimental investigations.

Mr. BAILEY. — Do I understand that you were simply given this line of work to make an estimate?

A. I was given Haggett's pond, Pomp's pond, and the Shawsheen river, and gave them an estimate of what I considered best.

Q. What is the estimate of water per day for the works?

A. Three hundred thousand gallons.

Q. Have you made any estimate as to the damage to the mills below?

A. No, sir.

Mr. HAMMOND. — There is a dam about two miles above where they propose to take this supply?

A. I believe so.

Q. Are you aware that there are times when there is not water enough to run that mill?

A. I read in a report two years ago that they did not have water enough to run the mill by water all the time.

Q. Have you not seen the bed of the river dry?

A. I have seen the water very low, but not dry.

Q. You have not surveyed the water-shed of the Shawsheen river at any point, have you?

A. No, sir.

Q. Have you made any investigations?

A. No, sir.

Q. You should say that a water-shed of twenty-five million gallons would be sufficient to supply the town of Andover with water?

A. Yes, sir.

Q. Ten million gallons would, — would it not?

A. Yes, sir.

Q. You have not advised any storage basins, — have you?

A. No, sir.

A COMMITTEEMAN. — It is very evident, I take it, that the stream is low in the dry season, and that it is absolutely desirable that there should be a certain amount of water passing?

A. Yes, sometimes more than others.

Q. Would you think it desirable to have a storage-basin for Cambridge sufficient to afford a supply in the dry season?

A. I have no doubt but that it would be a good scheme.

Q. Aside from the expense, would it not be a prudent thing, if Andover is going to put in water-works there, to be sure and protect the basin above Ballardvale?

A. I have no doubt it would be a good thing aside from the expense.

Mr. HAMMOND. — What is the size of the reservoir you propose to construct; how many gallons do you intend it shall contain?

A. Five hundred or six hundred thousand gallons; two or three days' supply for the present use of the town.

Q. You propose to supply three thousand inhabitants — and how many gallons to each inhabitant?

A. Sixty gallons a day.

Q. That would be one hundred and eighty thousand?

A. Yes, sir.

Q. Suppose you should have a large fire there: it would use up your reservoir in a short time?

A. The engines would be pumping all the time into it.

A COMMITTEEMAN. — Did I understand that you made no estimate of the supply from the Shawsheen yourself?

A. No, sir.

Q. You do know something about that, don't you?

A. I have read the testimony of two years ago.

Q. Do you remember what that testimony was?

A. I understand that the estimated supply for Boston and Cambridge was twenty millions a day.

Q. Did you include any cost of sewerage?

A. That is simply the water supply. I cannot say anything about that.

The CHAIRMAN. — Is simply for use for fire purposes, no drainage?

A. No, sir.

Q. If for domestic purposes, is there any other method of drainage that you have considered?

A. None, except that of irrigation; it might, at least, be distributed.

Q. Could it not be stored in cesspools, and be removed from day to day?

A. I presume, for the present, the system might go on as it now is; finally, a system of proper drainage would have to be adopted.

Q. With the introduction of water, you assume it would be necessary?

A. Not at present, but finally.

Q. Whether the sewage could not be retained in the cesspools and removed, instead of being carried into the river?

A. I presume it could.

Q. As an engineer, you have never made a calculation as to cost?

A. I have not.

Mr. POOR. — Have you considered the feasibility of conveying this sewage into the Shawsheen?

A. It was concluded that I need not investigate that matter. I made no investigation except as I glanced over the ground going through the town. I suppose, at present, it would go into the river. I was not asked to investigate, when talking it over.

Q. Do you know the average flowage of the river?

A. No, sir.

Mr. RUSSELL. — If the flow was found to be five million of gallons a day, would you consider it safe to take it below Bradlee's mills?

A. I think it would.

Q. If above, where would you place your pump?

A. I cannot say; I have not investigated that enough to know.

Mr. POOR. — At this point I will read from the last year's testimony.

[Copies to be furnished the committee.]

MR. FLINT.

Mr. POOR. — You are the Treasurer of the town of Andover, are you not?

A. Yes, sir.

Q. Whether Andover is financially able, in your judgment, to introduce the water?

A. Certainly it is.

Q. What is the condition of the town, — is it in debt?

A. The last report shows that it was out of debt; had \$11,000 in the treasury. This year the tax-rate was \$6.50; last year it was \$5 00.

Q. Whether, in your judgment, the town would put in water-works if authority were granted them?

A. I think they would.

A COMMITTEEMAN. — What is the valuation of the town?

A. About \$3,000,000.

Mr. BAILEY. — Do you know anything about the negotiations between your town and the owners of the mills below this point?

A. No, sir.

Q. Do you know whether there have been any?

A. I heard there had, and understood the mill-owners would waive all claims.

Mr. POOR. — With reference to the mill-owners, I represent one of them. I believe that satisfactory arrangement can be made with the mill-owners.

WILLIAM S. JENKINS. — *Recalled.*

Mr. BAILEY. — Have you had any talk with the owners of mills ?

A. I have not.

Q. Do you know of anybody that has ?

A. No, sir.

Q. How many mills are there below here ?

A. Three, and one above it.

Mr. POOR. — Mr. Morse represents the Smith & Dove Manufacturing Co.

Mr. HAMMOND. — There is no opposition, except so far as the petition may be inconsistent with the petition of other parties. So far as Cambridge is concerned, we desire that the question should be considered after all the evidence is in.

Mr. POOR. — I will say at this point, on behalf of Andover, that I would be willing to accept a bill that would provide for sewerage as well as water-supply. We expect to have sewerage and would be willing to accept a bill making provision for that.

The CHAIRMAN. — Mr. Poor, you would be willing to accept a bill giving you the right to take the water from the Shawsheen, but not to empty the sewage into the Shawsheen river ?

Mr. POOR. — The topographical condition of the country up there is such that it seems impossible to run it off, except down the valley of the Shawsheen. The stream is always running below Fry village.

A COMMITTEEMAN. — You understand that the principal part of the drainage turned into the Shawsheen will be the same as taken out ?

A. Yes, sir ; with some slight addition, of course.

OPENING BY MR. HAMMOND FOR CITY OF CAMBRIDGE.

Mr. Chairman and Gentlemen of the Committee : —

The petition is as follows : —

[Petition read.]

I understand that no question is raised as to the service of the petition, and that the service has resulted in gathering together a large array of legal gentlemen. As I understand it, most of them represent the parties opposed to the petition. This matter has been twice before the Legislature, and if this committee was composed of the gentlemen composing the former committees I should not deem it necessary to make any very extended opening in behalf of the petition ; but as I must assume that the majority of the committee are ignorant of the facts, and as a brief, simple statement will enable you to see the bearing of the testimony, I will state as plainly and as

briefly as I can what the city of Cambridge wants, and why it wants it. Cambridge desires to take a certain quantity of water, not exceeding eight millions of gallons per day, from the Shawsheen river at a point where it crosses the old bed of the Middlesex canal, and to carry that water down by the bed of the old canal to the vicinity of the Mystic pond in Winchester, and thence to Fresh Pond for the purpose of distributing it to the inhabitants of Cambridge. To this end we desire to build a dam, near the old Middlesex canal, about seventeen hundred feet long and twenty-five feet high, and to create a basin of an area of about eight hundred acres. It is necessary to have this storage to avail ourselves of the supply furnished by the Shawsheen river. The Shawsheen is capable of supplying twenty millions per day upon the plan suggested. We only desire eight millions. What is done with the rest of it is a matter of indifference to us in one sense. The city of Boston will ask for authority to use the other twelve millions. However that may be, we desire authority to use the eight millions. So we ask for authority to take eight million gallons of water per day, or an amount not exceeding that quantity, from the Shawsheen river, at a point where I have designated, and to distribute it to the inhabitants of Cambridge, either through Fresh Pond or otherwise. This is an ordinary application of a city for the use of the water of a stream for domestic purposes. It is a request similar to that made by private corporations in other towns, and to our minds there is nothing that distinguishes this case from the ordinary case of the petition of a municipality to take the waters of a stream for domestic purposes. At points upon that stream, as upon other streams, there are people who desire to have the water remain as nature placed it, who make an extravagant use of the water compared with the use we want to make of it, certainly more extravagant than the use the people of Cambridge desire to make of it.

And now, Mr. Chairman, a word or two as to the reason why we desire to do this. Cambridge is a city of fifty-five thousand or fifty-six thousand inhabitants. By the United States census of 1880, the population was fifty-two thousand, and all the indications show it to be growing. It has fifty-six thousand to-day. It has been long supplied by water from Fresh Pond. It is not a city which has never had water furnished through pipes; it is a city which has scarcely any wells in it. We are dependent upon the water running through pipes as much as any other municipality in this world. I have some acquaintance with Cambridge. I do not know of a single family who use a well. There may be some wells in the outlying districts, but they are very scarce. We are absolutely dependent upon the supply of water from pipes. I speak of this feature as it distinguishes us from other cities. In 1856 a private corporation got authority from the Legisla-

ture to take the water of Fresh Pond and distribute it throughout Cambridge. They went to work under that grant, put pipes in the streets, and distributed the water. In 1865, by the authority of the Legislature, Cambridge purchased the franchise of the Water Company, and ever since then has been, in its municipal capacity, furnishing water to the inhabitants. Our supply was then from Fresh Pond. It became apparent, in 1875, that the supply was too limited, and a grant was obtained from the Legislature, in 1875, giving authority to Cambridge to take the water from Spy Pond, situated in Arlington, and Little Pond in Belmont, and the waters of Wellington brook, which is a brook in Belmont. It was supposed that all these ponds would furnish five or six million gallons a day, and would be sufficient for Cambridge for years to come. In 1879 the attention of the city government was called to the impurity of the water supply. Before speaking of that, however, I may say that, under the grant of 1875, a conduit had been built between Spy Pond and Little Pond, and between Little Pond and Fresh Pond.

[The speaker indicates the position of the three ponds on the map.]

Wellington brook is a brook, having its rise in Belmont and striking this conduit between Fresh Pond and Little Pond. This whole territory is low and marshy or boggy. The high-water mark at Fresh Pond is only one and eight-tenths feet above high water in Boston harbor, and the water to-day is seven feet below high-water mark of the tide in Boston harbor. It is a frequent occurrence that this whole vicinity is overflowed in the spring of the year. In 1879 the town of Belmont, then extending to the shores of Fresh Pond, or a certain part of it, authorized the construction of an extensive slaughter-house upon the borders of Fresh Pond, and within a few feet of the conduit which connected Fresh Pond with Little Pond. Upon territory so flat the erection of a slaughter-house so near the pond and so near the conduit was an alarming matter to the citizens of Cambridge, and the city government was asked, by a large portion of the inhabitants, to buy all the ground around Fresh Pond, so as to protect it from impurities, and that led to the question whether it was worth while to go to that expense. We employed Dr. Edward S. Wood. His word on the sanitary views of the matter cannot be disputed. He stands with any one, so far as chemical examination of a water supply is concerned. We had a committee, consisting of the Mayor, President of the Common Council, President of the Water Board, and others, who spent a great many days in investigating the whole matter, making soundings through this whole territory, testing the condition of the water supply; and the conclusion to which the experts and everybody else came was, that the supply was entirely unsuitable as a water supply. We never had used the water of Spy

Pond, and had hardly used the water of Little Pond. It was stated by our experts and our engineer, and confirmed by our own experience, that Spy Pond was entirely unfit for a water supply, and that Little Pond was not fit, and it was considered not safe to take the waters of either, and Wellington brook being situated in low land, that we must not take any water even from that except at certain seasons of the year; and those seasons of the year are, when the ground is frozen in such a manner as not to permit the water to absorb the impurities. At such times we take the supply from Wellington brook, and we can fill up Fresh Pond from it. That grant of 1879, Mr. Chairman and gentlemen, upon which Cambridge relied for water supply, finally came down to this, and this only: the simple right to catch the fitful waters of Wellington brook at such times of the year as the melting of the snow allowed the water to flow over the frozen ground into Fresh Pond. Owing to the impurities it is only at certain times of the year that we can take this water.

We come to Fresh Pond, which has a small water-shed, and has an area of one hundred and ninety acres. Originally the water-shed was twelve hundred acres. The pond now is situated in Cambridge entirely. Cambridge is growing. People are living upon the banks of Fresh Pond, and the danger of contamination is increasing, and the result is that now the water-shed of Fresh Pond has been shut off, so that now it is only five hundred and seventy acres, — less than a square mile. Cambridge, to-day, for its water supply, is dependent upon Fresh Pond, with less than a square mile of water-shed. Now, what is Fresh Pond? what is its capacity? I do not think there will be any dispute about that. It has never been placed at over one million seven hundred and fifty thousand gallons a day; and Mr. Craft has estimated its minimum capacity at one million six hundred thousand gallons. Now, what does Cambridge need? Cambridge, by the United States census of 1880, had a population of fifty-two thousand inhabitants; and I claim, to-day, that it has not less than fifty-five thousand inhabitants, — an increase of three thousand in three years. To supply it at fifty gallons per capita daily (and I do not think that is an unfair average, — the engineer has estimated it at sixty; but I will estimate it at fifty gallons) requires two million seven hundred and fifty thousand gallons per day. Fresh Pond is good for one million seven hundred and fifty thousand; therefore there is a deficit of one million gallons a day, for which we must rely upon our chances to take the water of Wellington brook. Even if Fresh Pond is reliable we must take as much as a million gallons a day, through the year, from Wellington brook, in order to make ourselves safe. That must be done at the times I speak of. I have assumed here that Wellington brook may always be used, or used for years, and that Fresh

Pond may be used. But our engineer told us that we could not rely even upon this supply as safe — that at any time it might be unsafe to take these waters. The committee also told us that the causes of contamination are gradually reaching Fresh Pond, and that we cannot expect that to be good for any length of time. You see how precarious our supply is. It is absolutely necessary that the authorities should ask for a further supply of water ; and it is not prudent to delay work one moment longer than it is necessary for them to get the authority. In casting about, in 1879, we were directed to the Shawsheen river as the only place where we could get a proper supply. The statements which I have made in my opening remarks in regard to the precariousness of our water supply are amply borne out by the report to which I have referred. We were told to go to the Shawsheen river. The waters of the Shawsheen, as we understand it, are peculiarly adapted to the uses of a water supply. Of course one of the main considerations in looking at a water supply is the probability of future contamination. There is no water-shed in this part of the State which is so little liable to contamination as the water-shed of this river. With respect to the purity of the water, the amount of it, the cost at which it can be obtained, the ease with which it can be stored, and in every other respect, this seems to be the fit supply for Cambridge. It is a good supply, and that is why we ask for it. It is probably known to you that Cambridge has before made application for this water. We applied for it two years ago. At the same time Boston applied for it, and the committee gave Boston leave to withdraw, and, I think, unanimously reported a bill giving Cambridge the right to take the water. The bill went into the Senate, and it was thought, for some reason or other, that Boston ought to have a further hearing. The bill was therefore referred to the Legislature of 1882. It came up here last year, and after an extended hearing, a report was made, which I will read. [Document read.]

The committee believe that Cambridge ought to make an attempt to get water from Boston ; and, as you see from the report, it was recommended that the matter be left to the next General Court. Since then we have made attempts to get water from Boston. We have not succeeded ; and I have no doubt that, in behalf of its own people, Boston will say that they have been short of water themselves. I recollect reading a statement in the newspapers to that effect. My only purpose is to show you that while this subject has been up three times our petition has never been refused, but decision upon it has always been delayed. We ask for decision this year, and we believe that a careful investigation by the committee will convince them that our request is reasonable, and that the response will be favorable. To-day the water in Fresh Pond stands, after all these

thaws and after we have taken what we can at Wellington brook, 2.8 feet below where it was a year ago. This will give you an idea of the extreme precariousness of our supply.

The CHAIRMAN. — Is the Shawsheen river the best supply for Cambridge?

A. I believe so.

Mr. BAILEY. — Do you ask for the same bill that you did last year?

A. A bill was presented last year by Cambridge, which I don't believe has a parallel. It has been stated that at times the Shawsheen river has a flow of not more than five or six millions a day in the dry season, and at other times two hundred millions. We have measured it. Our bill of last year said that we should always allow sufficient water to escape from the reservoir, so that in the stream at that point should never be less than ten million gallons a day. We certainly proposed to have not less than ten millions; in other words, we proposed to do exactly what mill-owners on streams through this State frequently do for their own interests. But this bill was opposed by the mill-owners, and by Andover. I therefore became convinced that any bill which I could present here this year would be opposed. I will submit a bill to the committee after they have arrived at their conclusions.

The CHAIRMAN. — Has there been any estimate, since the last year, as to the cost of the dam?

A. I propose, without going into many details, to put the engineer on the stand, and he will give all the information you desire.

R. M. MORSE, Jr. — Before Mr. Hammond offers any evidence in support of his petition I wish to make a suggestion to the committee which may shorten the hearing. This is the third season that the citizens of Andover, and the various manufacturers depending upon the Shawsheen, have been called upon to meet the applications of Cambridge and Boston. I do not believe that this committee, with all the information on the subject which it can get, can go further than did the committee of last year. That committee reported (Senate Doc., 1882, No. 227) that they were of opinion "that the city of Boston can supply water enough for years to come for its own citizens, and, in connection with the present Fresh Pond supply, for the city of Cambridge also . . . that the evidence presented by the city of Boston tended to show that the said city would be willing to sell to the city of Cambridge all the water that the latter needs in addition to its Fresh Pond supply . . . that until the city of Cambridge has first ascertained that it cannot obtain from Boston, upon fair and reasonable terms, the water that it needs, they would not be justified in reporting a bill to allow that city the right to take water from a river twenty miles distant, to the probable detriment, now or

in the future, of another community." In that connection I desire to refer you to chapter one hundred and twenty-six of the Acts of 1880.

Mr. BAILEY. — Supposing the city of Boston should supply Cambridge under that act, whether or not there would be an additional claim for damages by the parties who have taken water from the city of Boston?

Mr. R. M. MORSE, Jr. — I am not so well prepared to answer that question as the City Solicitor; but I understand that the city of Boston has paid full damages for the taking of the entire Sudbury river, and that no additional damages could be claimed. — What I was calling the attention of the committee to is this, that there is at present legislative authority for Boston to sell to Cambridge. There is an ample supply for both places, and for all the outside towns which Boston is now supplying. Now, it seems to me that the committee should require the city of Cambridge, before they proceed a step in this investigation, and involve us all in an extended hearing, to show what steps they have taken to comply with the legislative action of last year. If it is true, as I have heard, that no real attempt has been made to negotiate with the city of Boston, then it seems to me, and I say it with all respect to my friend on the other side, that he should not compel us to go into a hearing. It is not for the public interest that the same questions should be tried over and over again. If anything is to be gained from these hearings it is that they settle certain points. The Legislature of 1882 intended that the city of Cambridge should not be heard until it has been proved that the supply for Cambridge cannot be secured from the city of Boston. I submit to the committee that they request the counsel for Cambridge first to offer evidence to that point alone. If, then, it should appear that the city of Cambridge cannot get a proper supply from Boston, the whole question will be open for consideration.

Mr. HAMMOND. — I feel no surprise that my brothers on the other side do not like to hear this evidence. With regard to the city of Cambridge, it is a question of overwhelming importance. They know it. The only way they propose to meet us is to tell this committee that you are bound by the action of the former committee. Now, it so happens, Mr. Chairman and gentlemen, that we have had two hearings of this matter, one in 1881, after which the committee reported a bill. Is my brother Morse prepared to apply his doctrine of *res adjudicata* to that matter, and say that because the committee of 1881 reported a bill that a bill should be reported now? If the conclusions of the committee are adopted by the Legislature when they make a reference of the report of the committee to the next Legislature, why am I not right in saying that the Legislature of 1881 adopted the conclusions of this committee for a bill? It was voted to

report the matter to the next Legislature. The fact is, that when the Legislature is not inclined, finally, to pass upon the matter, either to approve or disapprove the passage of the bill, they refer it to the next Legislature. Now, we desire to go into this whole question. To the gentlemen upon this committee, who were on it last year, it will be tedious ; but there are gentlemen on this committee who were not here last year. A majority of this committee never heard of the matter before, and whether you will come to the same conclusions as the committee arrived at last year I cannot say. But it seems to me we ought to be allowed to put in our case in our own manner. We are met at the outset by the statement that Boston has the right to supply water to the city of Cambridge. I spent some time yesterday afternoon in investigating that subject, and, as far as I got, I did not find any authority. I read the statute down to 1864, and I do not believe it has the authority in any other way except under this statute, Chapter 126 of the Statutes of 1880, which has for its caption this : “ An Act in addition to the Act for Supplying the City of Boston with Pure Water.” [Section 2 read to the committee.] By Section 1, Boston is authorized to lay pipes from the reservoir through Beacon street, in Brookline, to Boston ; and by Section 2, it is also authorized to connect this pipe with the Mystic pumping-station by a pipe going through Cambridge.

It was thought to be a good plan if Cambridge could get a supply of that water.

I will ask the attention of the committee a moment to Section 1, which authorizes the construction of a conduit from the reservoir, through Beacon street, to Boston.

I would now call the attention of the committee to Section 6, which says : “ The city of Boston is also authorized, if the Boston Water Board shall be of opinion that the supply of water is sufficient for the purpose, to sell water to the city of Cambridge, when conducted through the main pipes laid by virtue of the provisions of section two of this act, upon such terms as may be agreed upon by the City Council of Cambridge and said Water Board.”

Now, as a matter of fact, they have laid a pipe through Brookline, but have not built a connecting line between Beacon street and Mystic station. If my brother can find any authority for Boston to supply Cambridge, I would ask him to point it out. It is true, gentlemen, and I think our friends will admit, that Boston cannot supply Cambridge with water. I would call the committee’s attention to the case of *Wm. H. Bailey vs. Inhabitants of Woburn*, 126 Mass., 416. The court there decided that the General Statute did not authorize towns to sell water. I assume that Boston could sell us the water, but she cannot unless she builds the connecting link.

WM. G. RUSSELL, Esq. — I think you will agree with us, that we have some right to be surprised at such a point being taken. It is not a new question whether Cambridge could secure water from the city of Boston. In proof of that, I refer to the report which our learned friend from Cambridge has referred to as the report of Mr. Chesbrough (see page 56 of report).

As long ago as 1878, or 1879, the proposition that Cambridge should get its water from Boston by a proper arrangement with Boston was recommended by a man whom we all recognized as the best water engineer in the country. For two years there has been a full and extended discussion and examination of this subject before your committees; and the question has been, in both years, whether it was necessary that the rights of parties on the Shawsheen should be interfered with. And the question always comes up, is there any other method which is better than the Shawsheen?—and that, we suppose, will be the ultimate question here, if we go into a full hearing. Is the taking of the Shawsheen necessary? For two years that question has been discussed, and the question before the committee has been, whether it was better to take the Shawsheen water, or for the city of Cambridge to come to the city of Boston for water. We have had the consideration of the whole committee and the Legislature on this matter, and nobody has ever intimated that the city of Boston could not supply the city of Cambridge, except for the reason that it has not had the water to sell. In 1880 or 1881 the city of Cambridge constructed a conduit, at a cost of \$20,000, to tap the water works of Boston at Brookline; they have actually laid pipes (16-inch pipes) around from Cambridge to Boston works. Certainly the city of Cambridge has acted under the good advice of my learned friend all the time.

MR. HAMMOND. — I gave no advice about it; but I certainly should have said take it from Boston whether she has the right to sell or not.

MR. W. G. RUSSELL. — The city of Cambridge has actually spent \$20,000 to lay a pipe to the city of Boston, in order to secure a supply of water, and this is the first time that we have ever heard, as the reason why they have not got it, that Boston had not the right to sell. It is very plain that this Legislature can give that right. All I can say is, that these hearings have been on the theory that if that was the thing to be done, it was a thing which could be done. It is in your power to give that power, and you might just as well give it now as later. This is certainly a new question, I submit, for the purpose of this hearing. We certainly have the right to confine the city of Cambridge to the point where the Legislature that last dealt with this subject left them, and that is, having referred this question to this Legis-

lature upon the point whether they could get their water from the city of Boston or not, they are bound, before they put us to the trouble of a further hearing, to show whether they have made an effort to get it from the city of Boston, and the result of that effort.

The opinion of the committee of 1880 was, that the city of Cambridge had the right to take the waters of the Shawsheen, and the Legislature overruled the committee. In 1882 I think the committee stood five in favor of the city of Cambridge taking the water of the Shawsheen, and the opinion of the six was, that Cambridge had no right to ask for water from any source until she had first dealt with the city of Boston to see if she could get it there. The opinion of the minority was, that if Cambridge guaranteed twelve millions flow per day they might have that river. They are asking now for what no man of that committee of last year gave to them.

Mr. HAMMOND. — Reference has been made to a bill. A town like Boston is authorized to take water for the purpose of supplying its inhabitants. This new bill provides that a town, say Boston, may supply water to other towns and cities. Well, my friends on the other side would admit that such a bill would be unconstitutional if it did not provide for the additional assessment of damages for the additional use of the water.

Mr. W. G. RUSSELL. — This bill gives compensation to any person that is injured.

Mr. HAMMOND. — The third section gives additional damages. We shall be met by that provision of the law, that additional damages would have to be assessed to Boston for furnishing a supply of water to Cambridge. I desire to say, Mr. Chairman, that I assumed (perhaps erroneously), through the hearing last year, that there was some authority in Boston to supply Cambridge with water. I say that the construction of this aqueduct, wherein Cambridge expended \$20,000, was absolutely necessary. Although I was not consulted about it, I should have said it is my opinion that Cambridge should build that aqueduct, and then let Boston furnish us with the water.

I understand, then, that my statements, as substantially made, are assumed by the other side as true with regard to the necessities of Cambridge. We are exceedingly economical in the use of our water, and have brought the supply from fifty or sixty gallons *per capita* down to forty-five gallons *per capita*. I am prepared to go on with the case, and put it in our own way. For my part, I protest most emphatically against the view that if there is another municipality which is prepared to give us water, we must go to that municipality. I say that it is not exactly the kind of water we want. We are told that here in Boston, during the summer time, seven-eighths of the people in Boston that like to drink water, — how large a propor-

tion that may be the committee knows as well as I do, — that a large proportion of the people who rely on water, buy it from the springs of Everett, and other springs. We say that Boston water is not the kind of water we want for Cambridge.

The CHAIRMAN. — At the present you are not prepared to put in any evidence that you have made an effort to get a supply from Boston?

Mr. HAMMOND. — That is a matter of record. In September last I will state that these negotiations with Boston were commenced. Negotiations were delayed until September; then the Mayor was authorized to petition Boston for a supply of water, and to see whether we could agree upon terms, and we have received no reply from Boston. We can put in all the evidence on that point in ten minutes, — the letter and everything else. I think the letter was written in September, and we have had no answer from Boston. All this has been done. We find the Boston Council a body hard to move and hard to get at.

Mr. MORSE. — Whenever that letter was written, it was only for the purpose of complying formally with the course pointed out by the Legislature of last year.

Mr. HAMMOND. — I am informed that an appointment was agreed upon for a day, which turned out to be election day, and the meeting consequently was postponed. I do not want to reply in advance. I see my brother Morse is prepared to say that was done for the purpose of coming before this committee. If Boston and Cambridge agreed to negotiate we should have known what had been done; we do not regard it as important, and no other municipality was ever refused the right to get its water in its own way. When the time comes, I shall say what I have to say upon that part of the subject. We come here in good faith, for the purpose of getting this water.

Mr. MORSE. — Upon the statement of my brother Hammond, it appears that a note was written, and in pursuance of that an appointment was made for election day, but the meeting did not take place. Now, if the parties really desire a conference, I say that they should have an opportunity of meeting. I submit that, as it appears by the records, the city of Boston has an ample supply of water, and that is the best and cheapest supply for Cambridge. The committee ought to say, having regard to the proper despatch of business and in order to do justice to all parties, that, as Cambridge has not yet had its meeting with the city of Boston, the remonstrants should not be put at this stage to the expense of a long hearing.

Mr. W. G. RUSSELL. — Perhaps we may be excused for having some reliance upon that point of our case, as it was satisfactory to the committee of last year, and satisfactory to the judgment of the Legislature of last year. We do not wish to accuse the gentleman of

bad faith, although he accuses us of bad water. The first hearing on this question was on the last day of January, and it is now three weeks since that time. It is three weeks since we were called here to deal with this question, and during that adjournment why could not the city of Cambridge have sent a note to the Government of the City of Boston, inviting them to a conference upon this subject? I submit it is very plain that they have not done it, because they did not consider it of importance. We say that it is of importance.

Mr. BAILEY. — I do not know that I have any particular part in this conference. This I will say, the report of the committee represents that Boston can furnish to Cambridge a sufficient supply of water for the next twenty years. That is not the state of the facts, we claim, as shown by the evidence.

The CHAIRMAN. — The committee do not accept the conclusions of any previous committee; they have not been acted upon or considered by us. We have before us the evidence of 1881 and 1882 at former hearings. We understand that all parties agree to submit that evidence to us; but if counsel desire to offer additional evidence we want to hear it. The committee will assume the need of Cambridge for more water, and that need not be enlarged upon.

Mr. POOR. — Perhaps my brothers will concede that the water of the Shawsheen is good drinking-water, and as such Andover is ready to take it.

Mr. W. G. RUSSELL. — We do not concede that the water of the Shawsheen, as they propose to take it, is any better than Boston water.

Mr. HAMMOND. — You will concede that the water as it runs is good water?

Mr. RUSSELL. — Yes, sir; as it runs it is good water.

Mr. POOR. — Andover is ready to take it as it runs; but if Cambridge dams it up on those muck meadows we do not want it. We want something better.

Mr. HAMMOND. — I will call first on behalf of our petition the City Engineer of Cambridge.

W. S. BARBOUR.

Mr. HAMMOND. — You are the City Engineer of Cambridge?

A. Yes, sir.

Q. For how long have you held that position?

A. Seven years.

Q. Has your attention been directed to the water supply of the city of Cambridge?

A. Yes, sir.

Q. Were you a member of the Commission appointed by the city in 1879?

A. I was.

Q. Was Mr. Chesbrough your consulting engineer?

A. He was.

Q. Did you have consultations with him of sufficient length and frequency to give him, in your judgment, all points in the matter?

A. Yes, sir; I think we did; I went over the whole matter with him personally.

Q. What conclusion did you and he come to with regard to the water supply of Cambridge?

A. We came to the conclusion that the water supply, as it was stated, was not sufficient, and with what we had there was danger of pollution.

Q. On that conclusion did you direct your attention to other sources of supply?

A. I did.

Q. Upon directing your attention to the different sources of water supply, you thought of the Shawsheen river, did you?

A. Yes, sir.

Q. Have you measured the flow of the river?

A. I have.

Q. What have you found it to be?

A. Varying at different seasons.

Q. How high and how low?

A. The lowest gauge about eight millions, and I supplemented that by saying that I thought the dry-weather flow would bring it down to possibly five or six millions. The highest gauge was about two hundred millions.

Q. Where did you make those gauges?

A. Where the river crosses the Old Middlesex Canal.

Q. It is your judgment, from the examinations you have made, that at that point, in the dry season, it would give five millions of gallons?

A. Yes, sir. This year I found it below five millions. I visited the same locality after our long dry spell to make the gauge.

Q. Less than five millions?

A. Yes, sir.

Q. Where was that gauge made?

A. The same place.

Q. How many gauges have you made there?

A. Quite a number.

Q. A dozen?

A. More than that.

Q. As near as you can get at it?

A. Perhaps twenty.

Q. What is the nature of the valley of the Shawsheen, as delineated at that point, as to the probability of future contamination?

A. I think the probability of future contamination is very slight. It is a sparsely settled district.

Q. What is the capacity of that basin there, as you desire to build it, — covering the part marked there in light blue?

A. Two thousand million gallons.

Q. And that would give us a supply for four hundred days?

A. Yes, sir.

Q. How high and how wide do you propose to build that dam?

A. Twenty-five feet high and seventeen hundred feet long.

Q. Would there or would there not be water going out of there frequently?

A. It could be arranged so as to let it out.

Q. So far as the bill of last year alludes to the amount of water which can safely go by that point, it has your approval?

A. Yes, sir.

Q. Whether, in your judgment, that is the most practical, most feasible plan, so far as you know, for Cambridge to get water?

A. It seems to me to be the best.

Q. Have you made soundings in that basin where you intend to build the reservoir?

A. Yes, sir.

Q. What did you find to be the depth of the material which it would be well to remove?

A. It is quite shallow, varying in places, where there is scarcely any overlay. Seven feet was the deepest.

Q. And it would be your plan to remove such material as experience has found to be detrimental to reservoirs?

A. Yes, sir; remove certain portions of it.

Q. Do you know of any reason why water which is stored should not be suitable for drinking purposes, within a very short time?

A. No, sir; I do not.

Q. Is that a comparatively deep basin, as you intend to have it?

A. Yes, sir, it is. I think it is a very nice basin.

Q. Have you made an estimate of the cost?

A. Yes, sir; \$700,000.

Q. What does that include?

A. All that is necessary to bring the water to us. It includes the dam, laying the pipe from the dam to Fresh pond, and what works we should do in the basin.

Q. Do you feel at all sure that you can draw it through Fresh pond,

or would you desire authority to bring it through without going through Fresh pond?

A. At present I see no difficulty in conducting it through Fresh pond; but I should desire to have it come through without going through Fresh pond.

A COMMITTEEMAN. — In your estimate did you calculate the clearing out of this basin that you are going to construct?

A. A certain portion of it, — the shallower portions of it.

Mr. HAMMOND. — Did your estimate include land damages?

A. Yes, sir; double the value of the land. I got the best information I could as to the value of the land there.

A COMMITTEEMAN. — What is the nature of the soil?

A. Mostly sand and gravel. Little or no mud.

Mr. HAMMOND. — Did you measure the depth of the mud?

A. Yes, sir.

Q. How many soundings have you made there, in the basin?

A. One hundred and sixty, or one hundred and seventy. I have gone all over it.

Q. And you found loam there varying from six inches to seven feet?

A. Yes, sir.

Q. Generally shallow?

A. Yes, sir.

Q. What do you call shallow?

A. Two feet.

Q. What is the length of the dam?

A. Seventeen hundred feet.

Q. What is the area of the water-shed of this basin?

A. Thirty-four square miles, including the basin.

Q. What is the water-shed of the Shawsheen below your dam, between there and Andover?

A. Twenty square miles.

Q. Twenty square miles below your dam, and above Andover?

A. Yes, sir.

Q. Have you examined that water-shed to see whether there are any considerable streams that run into the Shawsheen from there?

A. Only from the maps.

Q. What is the lowest amount of water you think it proper to provide for *per capita* in providing the water-works?

A. Fifty gallons.

Q. Prudence would require a little more than that, would it not?

A. Possibly; large cities generally exceed that in actual use.

Q. Whether from your experience in Cambridge as City Engineer, with such attention as you have been able to give this matter, you are satisfied that this scheme of Cambridge is a practical one?

A. I think it is.

Q. So far as you know is that the view of the authorities?

A. Yes, sir; I so understand it.

Q. I suppose your general statement with regard to how the water is to be brought down would confirm what I said in the beginning?

A. Yes, sir.

A COMMITTEEMAN. — Supposing that dam was made twenty-five feet deep, and the water remained in the pond all summer, whether it would be any better than the Cochituate water?

A. I consider this basin the best I know of for storage purposes, and I think the water would be perfectly good.

Q. Do you know anything of the nature of the soil of the meadows, whether it is similar to that in Sudbury river?

A. I believe it is different, — it is higher colored. There are a number of soft meadows. These here are quite hard meadows; teams go over them.

Q. Did you ever visit the meadows of Sudbury river?

A. I have been in that vicinity.

Q. Don't you think they are able to go across there with teams to gather their hay?

A. There may be times when they can do it.

The CHAIRMAN. — Do you believe the water would be as good as now if you did not remove the earth, but left it as now?

A. I don't think it would.

A COMMITTEEMAN. — Have you read the report of the meeting of the Commissioners of Boston?

A. I have.

Q. Do you agree with that report?

A. I believe it is desirable.

Q. The report went beyond that; it stated it was necessary to have clean basins, if you wanted clean water, did it not?

A. Yes, sir.

Mr. MORSE. — Have you made an estimate of what it would cost to remove the whole of the earth?

A. No, sir.

Q. You are not prepared to say what it would cost to build a reservoir in the way this Commission reported?

A. Not to remove all the loan.

A COMMITTEEMAN. — Have you made an estimate of what it would cost?

A. I made an estimate of what it would cost to remove some of the shallow parts — about one-third.

Q. What was the cost to remove that part, say one-third?

A. \$100,000.

Q. And to remove the whole it would cost \$300,000?

A. I should say so.

Q. The difficulty is with the shallow portions, is it?

A. Yes, sir.

Mr. HAMMOND. — The water gets warmer if the sun shines through it, does it not?

A. Yes, sir.

The CHAIRMAN. — Therefore it is necessary to remove all the earth of the meadow?

A. Yes, sir.

Q. You spoke about estimating upon one-third of the whole?

A. Yes, sir.

Q. If that one-third was two feet and the deeper portions were seven feet, don't you think it would cost a good deal more to dig out the deeper portions than the shallow ones?

A. Possibly.

Q. It would cost more to dig out seven feet, would it not?

A. Certainly.

Q. In this eight hundred acres would there not be a great amount of shallow pond?

A. No, sir; I think not.

Q. What would you call shallow?

A. Anything less than ten feet I would call shallow.

Q. Then it sets back until it is two feet deep, and extends over the meadow each way?

A. I do not know.

Q. At the upper end how deep do you call the water?

A. There are portions of the upper end where it would perhaps be not over three to six feet.

Q. Everybody understands that a stream spreading out on each side would be shallower on the sides than it is in the middle?

A. There would be shallow places.

Mr. W. G. RUSSELL. — How wide is the river?

A. Thirty feet on the average.

Q. Take that part that is above the line of Bedford?

A. No, sir.

Q. How wide is it up there?

A. It goes down to fifteen feet, and possibly less than that.

Q. Parties testified here, last year, that they could easily jump over; how much was the average as compared with the rest of the stream?

A. Almost all average.

Q. Would you estimate the average depth of that water as ten feet?

A. Yes, sir.

Q. Do you mean that the whole area will average ten feet deep?

A. Yes, sir, and more than that.

Q. You made the estimate last year, did you not?

A. Yes, sir.

Q. And you included all excavations?

A. I think not.

Q. Is there any gain this year in the item of economy, or of expenses?

A. I have not taken away or added.

Q. Your estimate is upon the theory of carrying the water into Fresh pond?

A. Yes, sir.

Q. Have you estimated the expense of any other method of carrying it into Cambridge, not carrying it through Fresh pond?

A. That would simply mean carrying it round to our pumping works, on the edge of the pond.

Q. So that the expense would be about the same?

A. About the same.

Q. What is the capacity of Fresh pond?

A. Four to five hundred millions.

Q. Above the conduit?

A. Yes, sir.

Q. When did you make the soundings which you have spoken of, over this bed or surface?

A. Part of them the present year and part last year.

Q. You sounded over the whole eight hundred acres?

A. I think so.

Q. And you think one sounding in five acres was sufficient to give you the character of the soil.

A. I think it gave me a very fair average.

Q. As I understand you, as advising the city of Cambridge, you would advise them to be satisfied with a bill providing for a flow of ten millions each day to be left to the mill-owners?

A. On certain conditions.

Q. What conditions were they?

A. That we had the river ourselves.

Q. That is, if Boston and Andover did not take the water?

A. Boston I referred to particularly.

Q. Have you, since the last hearing, examined any other source of water supply for Cambridge than those which you had previously examined?

A. I went on the invitation of some gentlemen who thought Stony brook was a suitable source of supply. I went over the ground with these gentlemen.

Q. Who were they?

A. Mr. Crafts, Mr. Forbes, Mr. Gates, and Dr. Woods.

Q. When did you do that?

A. Sometime last fall.

Q. How long an examination did you make?

A. I spent the day there.

Q. Is that the whole attention you have given the supply?

A. Well, no, sir.

Q. Have you ever examined it before?

A. I have examined it since then.

Q. When were you there since?

A. Various times since then, looking over the territory, to see what might possibly be done in that direction.

Q. Have you taken any measurements?

A. Some.

Q. Have you made any estimates?

A. Some.

Q. Have you presented them to the city of Cambridge?

A. No, sir.

Q. You have spoken of the difference between this basin and the Sudbury basin, in regard to the character of the soil. What do you understand to be the formation of the basin of the Shawsheen?

[Mr. Barbour suspended.]

EDWARD S. WOOD.

Q. Are you the gentleman who was employed by a special committee of Cambridge, in 1870, to investigate their water supply?

A. Yes, sir.

Q. You investigated the sanitary features of it, and Mr. Cheshbrough the mechanical?

A. Yes, sir.

Q. With regard to the Shawsheen and its basin, have you examined that?

A. I have examined the water.

Q. It stands well for purity, does it not?

A. It is better than the Sudbury and Charles.

Q. You know generally about the water-shed, do you not?

A. Yes, sir.

Q. How does it stand, in your judgment, on the question of future contamination, — the likelihood of it?

A. We made a very careful study of it in 1874, and concluded, at that time, that it was less liable to contamination than either the Charles or the Sudbury. It is absolutely necessary to clean out the basins if you want pure water. Water generally purifies itself in ten

to fifteen years. The decomposition of organic materials at the bottom of the basin cannot add to the healthiness of the water.

Q. Were you employed by the committee that recently reported to the city of Boston on the water of Sudbury?

A. I was employed by the Water Board of Boston. I recommended the cleaning out of the basins when I recommended the Sudbury water, and further than that, that the water should not be used for five or ten years, in which time it could clear itself.

Q. Do you know the capacity of storage of Stony brook?

A. I do not.

Q. What do you think about that place as to liability to contamination?

A. I did not examine that; I only examined the water. It was the usual New England water, and was very good.

A COMMITTEEMAN. — With regard to these basins you have heard what the engineer has said; would you consider it safe to clean out certain portions of that basin under six feet, and have seven feet deep of muck lying there?

A. No, sir; I would prefer it all taken out.

Q. That is your idea, if you were going to make a safe basin?

A. Yes, sir; that is my idea.

Q. Do I understand you to say that you do not consider Sudbury water could be used before ten years?

A. Our superintendent made a great many trips out there, and it was considered that the water was not, or would not, be fit to be used for five years.

Q. If I understand the report of the Commission, you attribute the greater portion of the impurity of the water of Boston to the impure condition of the basins?

A. Yes, sir. When the basin was first built there was so much sulphate and chloride of sulphur, caused by a rapid decomposition of the organic materials then in the pond, as to tarnish metallic surfaces on the leeward side of the pond.

Q. Which basin was that?

A. I do not now remember.

MR. HAMMOND. — I understand you to say that, years ago, when these basins were constructed, that was your opinion, and you so said?

A. Yes, sir.

Q. And you would state to Cambridge that, in order to use the basin, they should clear it of vegetable matter?

A. Yes, sir.

Q. There is no reason, then, why it should not be all right?

A. No, sir.

Q. I believe the deeper the basin the less liable to vegetable growth?

A. Less liability to decomposition, if you choose.

A COMMITTEEMAN. — It would take the water a long time to get pure, would it not?

A. Yes, sir.

Mr. BAILEY. — You mean that this water would be thick to drink?

A. Yes, sir.

Q. You cannot state it definitely for any single pond?

A. No, sir.

Q. But it will work its own purification in time?

A. Yes, sir.

A COMMITTEEMAN. — In your experience, would you feel that it was perfectly safe to have a basin where there was this large quantity of muck,— would there not be some danger of these growths growing out of this filth?

A. Certainly ; great danger of it.

The CHAIRMAN. — The only safe way to remove that danger is to remove the loam and vegetable matter?

A. Yes, sir.

Mr. W. G. RUSSELL. — Is there any objection to shallow basins, independent of the question whether you have cleaned them out or not?

A. Yes, sir.

Q. What is the objection to the shallowness of the water?

A. It becomes heated.

Q. So that a great part of the impurity of the water may come from shallowness?

A. Yes, sir.

Q. The depth of the basin is an important feature in its value, is it not?

A. Yes, sir ; deep water is preferable at all times.

Q. You have spoken of the water of Stony brook, and that you found it good?

A. Yes, sir ; I made an analysis of it.

Q. And you reported it as good water as that of the Shawsheen?

A. Yes, sir.

The CHAIRMAN. — What is the capacity of Stony brook?

A. I do not know.

[Report of Dr. Wood on Stony-brook water, read by Mr. W. G. Russell, from pages 11 and 12 of report of Messrs. Crafts, Doane, and Forbes.]

Mr. BARBOUR. — *Resumed.*

Mr. RUSSELL. — You were asked by Mr. Hammond if you made your investigation of the Shawsheen, and its adaptation for a water

supply ; and you said that it seemed to you the best. That is the way you stated it, is it not?

A. That is the way I decided that it was the best place to go to.

Q. When was that?

A. It was before the first hearing in 1879. I think we took the matter of the Shawsheen at the time, and both thought it would be a good place to go.

Q. When you say "we" you speak of Mr. Chesbrough and yourself, do you not?

A. Yes, sir.

Q. And that has been your recommendation ever since, has it not?

A. Yes, sir. So far as I am personally concerned I feel as though we should have an independent supply, and that we can get it at less cost than by coming to Boston.

Q. And you have always impressed that view upon the city?

A. That has always been my opinion.

Q. And that is the opinion of Cambridge, is it not?

A. I do not know as I can answer that, though I know that they are united on the matter of Shawsheen.

Q. You never knew of any unity on the matter of procuring a supply from Boston, did you?

A. No, sir.

Q. Did you ever find any sentiment at all, in the City Hall, in favor of their getting it from Boston ; and if so who has expressed it?

A. I do not know whether I can answer that.

Q. You can say whether you have or have not. Is it a fact that there has been an inclination that way?

A. I think there has been an inclination that way. I think Mr. Carter, of the Board, thought we ought to try Boston.

Q. When?

A. I don't recollect ; he spoke to me several times ; but at different times, when we have been talking upon this matter.

Q. Since the last hearing?

A. Yes, I think he has spoken to me about it since the last hearing.

Q. Before or after his illness?

A. I think before.

Q. He thought you ought to come to Boston?

A. He thought we had better see what we could do there.

Q. What did you do?

A. It was the understanding that we should make application to Boston.

Mr. POOR. — In your estimate of damages, did you include any mill-damages?

A. No, sir.

A COMMITTEEMAN. — With regard to the stated feeling in the Water Board, are you sure that all the members of the Water Board favored the taking of the Shawsheen river?

A. I do not know that I can answer that question. They are united enough to come here and ask for it.

Q. Are you not confident that there are certain members of the Water Board that are opposed to taking the water of the Shawsheen?

A. I do not know of anybody.

Mr. W. G. RUSSELL. — Mr. Carter was warmly in favor of your coming to Boston, was he not?

A. Yes, sir ; I believe he was.

Adjourned at 10 o'clock, Feb. 21st.

Resumed Feb. 21st, at 10.25 P.M.

Mr. BARBOUR. — *Continued.*

Mr. HAMMOND. — Why has the water-shed of Fresh pond been reduced to less than six hundred acres?

A. On account of contamination in the water-shed.

Q. It has been for that reason solely?

A. As far as I know, that is the only reason.

Q. And, in your judgment, it was necessary for the protection of the water?

A. Yes, sir.

Q. From your knowledge of the pond, and the whole subject of the water supply of the city, do you expect that the water-shed will be still further contracted?

A. I think it will be necessary to do so.

Q. For the purpose of preserving the purity of the water?

A. Portions of it should be cut off now.

Q. Describe to the committee the method adopted by Cambridge to get water from the pond to the reservoir. Are the water-works on the banks of the pond?

A. We have a pumping-station in which there are, at the present time, three engines, — two of them of five millions gallons capacity, per twenty-four hours ; that is their rated capacity, and they do that easily and more. The other one is a smaller one, — rated at one million gallons, — and that is now supplying our high service, and during last year has been separated from the low service. We have one

engine for high service and the other one for low service, and they alternate.

Q. These pumps pump from a well in the building on the borders of the pond?

A. No, sir. The engine is situated seven or eight hundred feet from the shores of the pond and the engine-house and wells from which the water is pumped.

Q. Does the water go into the wells?

A. Yes, sir; by a brick conduit of four feet. It is about seven hundred feet from the engine-house; the top of that conduit is seven and ten-twelfths feet below high-water mark, — that is, the top of the conduit.

Q. Has water been pumped from that pond so as to be below the top of the conduit?

A. It has.

Q. How many inches?

A. About fourteen to fifteen inches.

Q. And when was that?

A. That was in the fall of 1880 and spring of 1881.

Q. And when it gets below the top of the conduit, is there difficulty in getting water into the well-room?

A. There is. At that time the suction of one of the pumps was entirely out, and the other one was just so that we could take it.

Q. When the water is reduced to so low a depth as that, what is the area of the pond?

A. About one hundred and fifty acres.

Q. What is the entire area of the pond?

A. One hundred and eighty-eight acres.

Q. Could you dig out the pond so that its acreage would be the same?

A. We have dug out a good many of the shallow places. I know of but one place which might be dug out to increase the storage, and that would be very little.

Q. Is the pond filled up at any time in the year?

A. Yes, sir; generally filled up about this season of the year.

Q. From what?

A. From Wellington brook.

Q. And you take the waters from Wellington brook only when the ground is frozen?

A. That is our rule; and when there is snow on the ground, if possible.

Q. If at any time the pond should not fill up in the spring, what, in your judgment, would be the result, — whether there would be a sufficient supply for use or not?

A. I think the chances are that there would be but a small supply of water.

Q. As a man connected with the City Government, do you feel it safe for Cambridge to rely upon the present supply?

A. No, sir, I do not.

Q. Do you think it is safe now not to think of the future?

A. No, sir.

Q. That is, if there should be a dry time, we are liable to be in a water famine?

A. If we do not get water in sixty days we are going to see such a time, — there will not be water enough to carry us through.

Q. Do you know how much it is at this time below the point at which it was this time last year?

A. Nearly three feet lower than it was a year ago at this time.

Q. And it is higher now than it was three weeks ago?

A. Just a foot higher than it was on the 30th January.

Q. So that by the thaws and rains of the last three weeks we have gained but one foot?

A. We got half of it last Saturday.

Q. In one day?

A. Yes, sir.

Q. Is it your opinion that it is safe to rely at all for any length of time on Wellington brook?

A. No, sir, it is not.

Q. Give the committee the reasons.

A. On account of the situation of the brook ; the territory through which it runs ; and the short and uncertain times in which we have to take the water.

Mr. HAMMOND. — I wish to read the following from the report of Dr. Wood, page 53 of the printed report — fifth recommendation : —

That the water of Little pond and Wellington brook is, at times, polluted to so great an extent, and with material of so dangerous a character, that these waters are totally unfit to be used as sources of water supply ; and since this pollution is of such a nature as to render it impossible to prevent it from entering these waters their use should be discontinued, and they should be prevented from entering Fresh pond.

I read this to show this committee, such are the necessities of our case, that, in opposition to the positive recommendation of our sanitary expert, we have, at our own risk, taken the waters of Wellington brook. In that way our authorities are obliged to take the risk, which our medical expert states it is not safe to take ; and we are taking it to-day, and have done so for years.

Q. From your knowledge of Wellington brook is there anything that would lead you to take its waters except absolute necessity?

A. No, sir.

Q. If you could avoid it, should you?

A. Yes, sir.

Q. Do you think there is any risk in it?

A. Yes, sir; every time we take it.

Q. And for the reason stated by Dr. Wood, I suppose?

A. Yes, sir.

[Mr. Hammond here refers to page 35, Dr. Wood's Report, which contains description of Wellington brook.]

This is the brook that we rely on to fill up Fresh pond, the use of which Dr. Wood has said is unsafe.

Q. And the reason why you take it when the ground is frozen is because that is the only time when you can take the water and not take any of the impurities from the ground?

A. Yes, sir.

Q. And, as a matter of fact, do you not wait until the brook clears itself before you attempt to take water?

A. That is our custom, to allow the first run to go by, and take the later one.

Q. And the first run removes the pollutions that have been taken into the brook for a long period?

A. Yes, sir.

Q. Now, about those privies; I understand that, shortly before this report was made, the Water Board of Cambridge built privies for the people?

A. They did build privies for the people.

Q. That territory is not in our city?

A. No, sir. Mr. Nevons and myself personally saw all the owners of premises where these privies existed, and made arrangements with them that, if they agreed to it, we would do the work at the city's expense; and this we did.

Q. You are familiar with the territory about Fresh pond, of course?

A. Yes, sir.

Q. How high is Fresh pond above high-water mark in Boston Harbor?

A. One and eight-tenths feet above mean high-water mark.

Q. Have you made any borings in the vicinity of Fresh pond? State to the committee when you did.

A. The borings are made at various depths, at every one hundred and twenty-five to one hundred and fifty feet, for the purpose of ascertaining the nature of the subsoil, and for the purpose of ascertaining whether there was an underground flow. In several places there is a

decided underground flow. Those borings are fully described in that report, with diagrams of each boring.

Q. Do you fear that Fresh pond itself may be contaminated?

A. I think there is a possibility of it, and a very great probability.

Q. Not only as to quantity of our supply, but do you believe that the quality is at all sure?

A. There are sources from which we have to take it which are liable to be polluted.

Q. Have you ever been called to the banks of the Wellington brook to see whether the water was fit to go through the conduit?

A. Yes, sir.

Mr. HAMMOND. — I want to state here that our city authorities have stood upon the bank of the stream, to see whether the water was fit to go into the pond or not.

A COMMITTEEMAN. — It appears that Mr. Barbour, and others in charge of this water, have taken reasonable means to preserve the purity of Fresh pond. Notwithstanding the difficulties that have been described, I would like to ask you whether the water supply of Cambridge proper is unhealthy water?

A. I do not consider it unhealthy water as it is to-day.

Q. It is as good as the average water supplied, is it?

A. I think that our analyses show much harder water and containing some impurities; still, at the present time, we do not call it bad water.

Q. You have to take more pains than in other places; but as you take it, you consider it good water?

A. I do not consider it bad water as it is; we are taking all the pains we can.

Q. You are taking pains to protect Fresh pond by cutting off some of the water-shed?

A. Yes, sir; a very considerable portion of it.

Q. I would like to see whether some of the same means applied to Little pond would not protect it.

A. I think the location somewhat different in regard to Little pond.

Q. And, in regard to Spy pond, do you think if you laid out a little more expense it would be possible to afford the same protection that you have given to Fresh pond?

A. I do not think so.

[Mr. Hammond calls attention of committee to page 36, report of Commissioners' recommendation of Dr. Wood.]

Mr. BAILEY. — I understand you to say that Fresh pond itself will become unfit, as a source of water supply, in the course of a few years?

A. There is danger of it.

Q. From what?

A. From the source from which we have to take the water.

Q. That is, on account of the use of the soil which forms the water-shed?

A. Yes, sir.

Q. That is used for what purpose principally?

A. The water-shed that has been cut off?

Q. No, that that now exists.

A. Our present water-shed, in some portions of it, is very objectionable.

Q. The greater part of it is used for gardening, is it not?

A. Yes, sir.

Q. It is becoming more thickly settled around there, besides, is it not?

A. Yes, sir; it is growing.

Q. The greater part of that impurity does not come from the city of Cambridge itself, does it, because that is lower down on the water-shed?

A. Part of it is in the city of Cambridge.

Q. The greater part of Cambridge is lower down?

A. The lower part is in Cambridge, but not in the thickly settled part of it.

Q. You are familiar with Mystic pond, are you not?

A. Somewhat.

Q. Whether or not the surroundings are the same as the surroundings of Fresh pond?

A. They are about the same.

Q. Whether, in your judgment, the danger of pollution to Mystic pond would not be the same as in regard to Fresh pond?

A. Yes, sir; I think so.

[Mr. Hammond refers the committee to pp. 27 to 32, inclusive, of the Commissioners' report, as to the liability of Fresh pond to pollution.]

A COMMITTEEMAN. — Have you ever seen Dr. Wolcott's report of the purity and impurity of the waters around Boston?

A. Only as I saw it in the newspapers. I have not got it very clearly in my mind.

Q. He reports on twenty-one sources, and puts Cambridge down as the worst of all.

A. I don't know as to that, I am sure.

MR. HAMMOND. — In considering the question of going to the Shawsheen river, have you been largely influenced in your views as to whether it would be a permanent source of supply, and one not likely to be contaminated?

A. Yes, sir; that is one very strong reason why I have advocated it.

[Mr. Hammond here refers committee to page 57 of Mr. Cheshbrough's report.]

A COMMITTEEMAN. — I understand you to say that one reason why you preferred going to Shawsheen river was that it would be a source of permanent supply?

A. Yes, sir.

Q. So that if the population increased, and Fresh pond should give out entirely, you would have an abundant supply?

A. I think so.

Q. I suppose, then, your idea was based upon the idea that if you once got your pipes in, so that you might, as provided in the bill, allow twelve millions of gallons to flow from it, that you would still have a sufficient quantity laid up in that basin, — that you could get any quantity of water from it that you chose to take, or your necessities required, in the indefinite future?

A. Yes, sir; we are using now two and a half millions, and the bill asks for eight millions; that would be nearly three times as much as we have now, and allow to provide for a large increase of population.

Q. My question bears upon this point: whether you think, having once got your pipes in there, expended your money, and dug out your basin, that, if you wanted an additional supply for your city, you would get it?

A. I think there are times when we could take from the surplus and get more than eight millions. I think in the arrangement made with Boston there was a provision made for a surplus over eight millions at certain times during the year, and how that water should be used.

Mr. W. G. RUSSELL. — Is this not an unusually large reservoir?

A. Yes, sir.

Q. Its contents are two thousand millions?

A. Yes, sir.

Q. How many days' supply is that, according to the present population?

A. Our present supply is two and a half millions in a day.

Q. According to that your reservoir would hold eight hundred days' supply, — something over a two years' supply of water?

A. Yes, sir.

Q. Have you ever known a system of water-works where the reservoir was made as large as that?

A. I do not recollect any at the present time.

Q. Is that not an extravagant proportion between the reservoir and the consumption, if you are going to make a reservoir?

A. It is large.

Q. If it is to be made at the expense of clearing out the whole area, is it not extravagant?

A. I don't know that it is. It depends upon whether we could do better or not.

Q. About the cost of that. Have you read the last report of the commissioners on investigation of the water supply of the city of Boston, — the report which has just been issued?

A. I have.

Q. Have you seen Mr. Davis' estimate of the cost of clearing out a basin like that?

A. I don't recollect it.

Q. Supposing that estimate to be correct, and to be \$600 to \$700 per acre, suppose the cost of clearing out a basin like this to be \$600 or \$700 an acre, would you not call a reservoir of eight hundred acres rather an extravagant luxury for a city to indulge in, unless there is some necessity for it?

A. It is ; but, as I said before, it depends upon whether we could do better or not.

Q. \$600 or \$700 an acre would cost more than half a million dollars, would it not?

A. If the eight hundred acres were cleared.

Mr. RUSSELL. — I will read a sentence from Joseph P. Davis' testimony: "To have taken the soil out of the basin entirely — not including the muck, but simply that which you would call soil — would have caused a very large expense. It would probably have cost six or seven hundred dollars an acre, and there are between five and six hundred acres in the territory." [See City Document 129, 1883, pp. 157-158.]

Q. How much did you estimate the amount to be removed from this basin when you estimated the cost at \$100,000?

A. About one-third of the meadow.

Q. How much is the meadow?

A. I estimated that at five hundred acres.

Q. And you propose to clear out the soil of one-third of that meadow, to what depth?

A. Dig out such portions as is deemed necessary.

Q. How much do you calculate to remove?

A. I intended to have it taken out to the gravel bottom.

Q. How much did you estimate that to be on one-third of the five hundred acres?

A. \$100,000.

Q. Let us be precise about it. You say you estimated that one hundred and sixty-seven acres only should be cleared of the whole five hundred; is that so?

A. I estimated it as I told you. I did not put it into acres. I put \$100,000 to be spent, as needed, on the bottom of that basin.

Q. How did you arrive at the \$100,000?

A. By looking over the ground, and forming the best judgment that I could.

Q. After you had gone over the ground, how much did you estimate required to be cleared of soil?

A. I stated about one-third.

Q. Did you make any figures at all as to the amount of soil that required to be removed?

A. Not in cubic yards.

Q. Did you make any figures that were not in cubic yards?

A. I estimated it.

Q. Did you make any other figures with reference to that computation?

A. Not as to quantities of material.

Q. Did you as to anything else but quantities?

A. I don't know what there would be.

Q. You neither put it into yards nor the cost per yard?

A. No, sir.

Q. Did you put it into area in any form, — acres, or feet, or yards?

A. Only in a comparative way, in my mind.

Q. I want to get as exactly at this thing as I can, to see how much of a computation you did go through; and I want you to tell the committee everything you did in the way of computation, as to the expense of removing the soil?

A. I do not know that I can do it any better than I have, — that one-third would have to be removed.

Q. One-third of what?

A. One-third of the meadow, and whatever objectionable matter there was.

Q. What were you going to do with the remaining two-thirds?

A. Let it remain there.

Q. What was the one-third of objectionable matter? How much space did it cover in that area of eight hundred acres?

A. I could not give it to you. I should not want to put it into any other shape than I have.

Q. You said before that you meant one-third of five hundred acres?

A. That is what I considered the objectionable part. I think I did state it before as one-third of five hundred acres.

Q. You mean to say that there are five hundred acres of objectionable matter there?

A. I say there are five hundred acres of mud there. At the time the estimates were made I did not consider it necessary to remove the whole of the meadow.

Q. You do now consider that there are five hundred acres of objectionable land to be covered with water?

A. There are five hundred acres of objectionable land to be covered with water. At the present time there is a difference of opinion, I think, whether or not it is necessary to remove the whole of this meadow. Dr. Wood stated that if sufficient time could be allowed the water to purify, it would not be necessary to remove the whole.

Q. What time did he state?

A. Five to ten years. If we require to move this meadow it will add to the cost.

Q. It would add to the cost if you were obliged to remove all the meadow. What is the other three hundred acres?

A. The rising shores of our reservoir, when we have finished it.

Q. What is that covered with now?

A. Partially covered with trees and bushes.

Q. What are you going to do with that three hundred acres, — leave it as it is, or clear it?

A. Cut away the trees.

Q. Will you take out the roots?

A. Yes, sir.

Q. Is not that going to cost as much per acre as the other?

A. I should think not.

Q. Have you made any estimate of the cost of clearing that three hundred acres?

A. That was, I think, included in the \$100,000, for improving the bottom of the basin.

Q. Can you give us any more definitely the cost of clearing the three hundred acres than you gave us for clearing five hundred acres?

A. No, sir.

Q. Can you estimate the cost per cubic yard of removing that soil?

A. Yes, I suppose I could.

Q. Will you?

A. Do you mean now?

Q. Yes. The cost of removing the soil from the meadow; what would be the average cost per yard?

A. I should say ten to fifteen cents per yard.

Q. Where would you carry it to for that cost?

A. If it were to be all carried away it would be necessary to put in excavators for that purpose.

Q. Is that not a lower estimate than you ever knew any man to make?

A. That quantity could be removed for that price.

Q. Have you any idea what that would amount to per acre?

A. The average depth of the mud is about two and a half feet.

Q. Take it at two and a half feet, what would it cost per acre?

A. That would involve a computation of the number of yards to the acre.

Q. Suppose you called it a yard deep, what would be the cost?

A. I cannot say. A cubic yard to every square yard of surface.

Q. How many cubic yards per acre?

A. I do not figure it readily in my head.

Q. There is one thing which I think you did not explain to the committee yesterday, and I do not find it in the report so clearly stated as I would like to have it: how do you propose to take this water to the reservoir, — through the old bed of the canal? How do you take it from the reservoir?

A. Take it with the iron pipe and run it through Fresh pond.

Q. A pipe of what diameter?

A. Thirty inches.

Q. At what level do you take it from the reservoir?

A. Ten feet below the surface.

Q. And your reservoir is about twenty feet deep?

A. Yes, sir. The dam is to be twenty-five feet high.

Q. How high do you propose to flow, in order to make your reservoir eight hundred acres?

A. Twenty feet.

Q. Well, then the ten lower feet of that water are useless for your purpose?

A. Yes, sir.

Q. What do you include when you reckon the contents of that reservoir to be two thousand million gallons?

A. The upper ten feet.

Q. How much have you got in the whole basin?

A. I do not know.

Q. Have you made any rough estimate of that?

A. I never made an estimate of the quantity below what we should take.

Q. Is it not a fact that you are obliged to cover eight hundred acres, because you are obliged to take the water at a level ten feet above the bottom? Is that not so?

A. It is better to have a good depth of water; I do not know of any reason why we should not lay the pipe lower.

Q. Could you not put your pipe at fifteen feet below the surface?

A. I could do so ; but I would rather take it at ten feet.

Q. Why don't you take your water five feet lower instead of at ten feet?

A. Ten feet is low enough for our purpose.

Q. The plan which you have is to take it at ten feet below the surface, and ten feet above the bottom?

A. Yes, sir.

MR. BROWN. — What is the difference in the level of the two ponds?

A. Ninety feet.

MR. W. G. RUSSELL. — You have stated the distance to be thirteen and one-half miles from your reservoir to Fresh pond?

A. Yes, sir.

Q. Have you actually measured that, or taken it from the map?

A. I think it was taken from the map.

Q. Have you been over the scale more than once, so that you are sure of that distance?

A. Yes, sir ; I have been over it many times.

Q. You have spoken of the level in Fresh pond, that it is three feet below what it was a year ago?

A. It is two feet and eight-tenths.

Q. How does it compare with 1881 at the same time?

A. It was below the conduit at that time.

Q. How much above it now?

A. About a foot.

Q. Will you make the figures computing the cost of clearing an area of eight hundred acres?

A. I could give you now the computation for the five hundred acres. I made that computation this morning, before I came in.

Q. What would it cost to remove five hundred acres two feet and a half deep?

A. Two million yards, at 15 cents per yard, would be \$300,000.

Q. Did you not agree, in the bill last year, to allow ten millions of gallons to run over the dam at all times?

A. Yes, sir, if we took the basin ourselves.

Q. And you provided for twelve and a half millions a day?

A. Yes, sir.

Q. MR. BAILEY. — Would you make that reservoir that size any way, whether you took eight millions or twenty millions of gallons?

A. Yes, sir ; our original plan was to make proper provision in time, and for that reason we thought it well to have a large basin.

MR. POOR. — Have you ever measured the Shawsheen river when there was less than eight millions of gallons per day running through?

A. Yes, sir; last August there was less than five millions running at that point.

Q. Why don't you use the water of Spy pond at the present time?

A. Because it is impure.

Mr. HAMMOND. — When was your last analysis?

A. We do not apprehend ever to be obliged to use the water of Spy pond.

Q. Have you had any analysis for five years?

A. I think so.

Q. Do you know of one in 1882?

A. I do not remember; the matter of analyses I have not attended to myself; they are attended to by the water office.

Q. What is the last one of which you have official knowledge?

A. I could not specify the date.

Mr. HAMMOND. — I wish to call the attention of the committee to the following recommendation of Dr. Wood, on the twentieth page of the Report of the Special Committee, 1879: "That the waters of Spy pond, Little pond, and filter basin, and of Wellington brook, except under the conditions above set forth, be not admitted to Fresh pond."

Mr. POOR. — Do you know to-day, of your own knowledge, any reason why Spy pond should not be used?

A. None other than the reasons which have already been given.

Q. Do you know whether they are taking water from Spy pond?

A. Yes, sir; they took some last year.

Q. Was there any trouble with that water?

A. No, sir; not that I know of.

Q. I had hoped you had knowledge of an analysis made last year.

A. You could get it from some of the city documents.

Mr. BAILEY. — Is it not a fact that Spy pond has passed that stage to which Fresh pond is approaching?

A. We cannot use it for domestic purposes.

A COMMITTEEMAN. — Is it not a fact that a very considerable portion of the drainage of Arlington runs into Spy pond?

A. I believe so.

Mr. MORSE. — I want to call your attention to your evidence of last year, bottom of page 35, "Report of the Hearing before the Committee," whether last year you intended to give the committee to understand that, in your estimate of \$700,000, was or was not included the \$100,000 for clearing the soil?

A. It is intended to cover moving a portion of the soil, as I said.

Q. Why didn't you state it last year? How happened you to leave out the item of \$100,000, — one-seventh of the whole estimate?

A. No particular reason why I left it out.

Q. And if you have not in every other year that you have been before the committee, until this year, said nothing about an estimate for clearing the soil?

A. I think there has been very little said.

Q. Why didn't you, as an engineer, mention that work as an element in your estimate in other years?

A. I intended to state generally what was expected to be done. I included that in the general work upon the basin.

Q. Have you any figures which you can show to the committee from which you made your estimate of six or seven hundred thousand dollars?

A. I have the figures.

Q. Where are they?

A. Here they are, sir. [Produces them.]

Q. When were these figures made?

A. They were revised in 1882.

Q. Have you the figures you made first for the year 1881?

A. No, sir; not here.

Q. Let us have the figures you made in 1882. At what time during the year were they made,—before or after the hearing before the committee?

A. They were made before; they are the same figures I had here last year.

Q. Let us have them.

A. The first item is —

Dam	\$87,000
Damming and preparing basins	80,000
13½ miles of pipe	377,912
Laying same	53,000
Work on the basins in connection with the dam	20,000
Contingencies	61,000
Total	<u>\$678,912</u>
Allowance	20,000
Making the total	<u>\$698,912</u>

Q. How much do you allow for cost of land?

A. \$40,000.

Q. Where do you get your estimate for removing soil in that basin?

A. \$80,000 and \$20,000 additional.

Q. How do you get the \$100,000?

A. \$40,000, \$40,000, and \$20,000.

Q. You allowed \$40,000 for the cost of the land?

A. Yes, sir.

Q. That leaves you \$40,000?

A. Yes, sir.

Q. Where did you get the \$60,000 additional?

A. I have given you \$100,000 altogether.

Q. You said to the committee last year when you made your statement, that you made allowances of \$100,000 for the dam and for removing the soil?

A. It is all for work on the basin.

Q. You cannot figure out \$100,000 for work, can you? Will you let me see your book?

A. Yes, sir.

[Book shown to counsel.]

A COMMITTEEMAN.—Whether, previous to the hearing last year, you supposed it would be necessary to remove any considerable portion of the soil from that basin? Had you contemplated any such removal in the first year, that is, before the hearing of last year? The hearing of last year, did not that develop the necessity of removing the soil from this basin, in order to have better water?

A. Last year I spoke of it.

Mr. MORSE. — Mr. Barbour has allowed me to take the book which has in detail these estimates; I desire to read them. This is the way it reads: —

On the Shawsheen, estimates of works, 1882: —

Dam	\$87,362 88
800 acres of storage-basin, at \$50	40,000 00
Cleaning and preparing bottom	40,000 00
13½ miles pipe, 30 in., average size 94.78, at \$42	397,912 00
Laying same, at 75 cts. per foot, 71,280	53,460 00
Total	\$618,734 88
Contingencies, 10%	61,873 48
Making a total of	\$680,618 36
Land damages, 2½ acres per mile; 10 miles = 25 acres	2,500 00
3½ miles, at \$1,000	12,250 00

He has added in about \$19,000, so that it figures up to a round total of \$700,000.

Q. Now, in making up that estimate, you certainly allowed in round figures about \$14,000 for right of way in canal, and for land damages for laying pipe?

A. Yes, sir.

Q. And what was the item you called in round numbers \$19,000?

A. That was to go in wherever it was needed.

Q. When you were reading to us a few minutes ago you were not reading from this book, you were simply stating figures?

A. I thought I was reading from the book.

Q. Did you ever make any other estimate for the removal of the soil, except that single item, "clearing and preparing bottom"? Have you ever said anything about any item for clearing and preparing bottom, except that \$40,000?

A. Not previous to this year.

Q. Did you ever allow any item of \$100,000 for clearing away soil?

A. In the way that I have stated.

Q. I must go back one step. Do you now want to change your estimate, — any one of the figures which you have given in this estimate?

A. No, sir; they can stand as they are.

Q. You have got to add at least \$60,000 to this estimate to get in your \$100,000.

A. I do not see that there is any more than \$40,000 to be added.

Q. If you can point out to this committee any item which makes up your \$100,000, I would like you to do so.

A. \$40,000, and \$40,000, and \$20,000 for contingencies.

Q. You never in point of fact included the \$100,000 as an item of itself, if it is an expense?

A. Not of itself.

Q. Didn't you tell Mr. Russell you had made an estimate of \$100,000 for clearing this soil?

A. I do not think I said it in that way.

Q. Can you find your figures for 1881, — those which you gave before the committee in 1881?

A. I have them at my office.

Mr. Poor. — Do you contemplate pumping this water — Shawsheen water — after you get it to Cambridge?

A. Yes, sir; to get it into Cambridge.

Q. Why do you pump it into Fresh pond, if there is a head of ninety feet?

A. That is not sufficient to supply all our consumption.

[Mr. Hammond calls attention to p. 22 of report, reading testimony of Mr. Wood in regard to Spy pond; also p. 14 of the hearing of last year, — Dr. Wood's testimony. Page 29 contained a table showing estimated growth of Cambridge, Waltham, and Arlington.

Cambridge in 1870, 1875, 1885, 1890 to 1925.]

HIRAM NEVONS.

Mr. HAMMOND. — You are Superintendent of Cambridge City Water-Works?

A. Yes, sir.

Q. Have you measured the height of Fresh pond within a day or two?

A. I have.

Q. What is its height to-day as compared with a year ago?

A. It is two and eight-tenths feet lower than it was a year ago; it was yesterday morning when I measured it.

Q. How was it three weeks ago?

A. Three weeks ago it was nine and five-tenths inches above the conduit.

Q. Do you corroborate Mr. Barbour's testimony in regard to the waters of Wellington brook?

A. I do.

Q. Do you watch the waters of Wellington brook, to see when it will do to let into the conduit the waters of the stream?

A. I do.

Q. Have you let it in at times when you have been driven by necessity to let it in?

A. Yes, sir.

Q. Has there been a consultation of the city officers, on the bank of the stream, as to whether it was safe to let it in?

A. That frequently occurs. Last year there was a large amount of objectionable matter. At times it was not let in until after consultation with the president.

Q. What is the average daily consumption for last year?

A. Two million four hundred and seventy-three thousand gallons.

Q. How much per head?

A. On the whole, the consumption was forty-four and one-third gallons per head.

Q. You have made a saving, as I understand it, this year of fifty million gallons on the water?

A. Yes, sir. We distributed fifty-two million gallons more this year than last, and only pumped nine hundred thousand gallons more than last year.

Q. You have discovered where the leaks and wastes are?

A. Yes, sir.

A COMMITTEEMAN. — What is the condition of the water compared with last year? You have not as great an overflow this year as last?

A. No, sir. Mr. Hammond calls Wellington brook a fitful stream, and I think that will account more for our condition than anything

else. At times, when there comes a heavy rain, our pond is raised eighteen inches, sometimes more; the effects of one storm will sometimes raise our pond considerably.

[Diagram of the various heights of water in the pond during the year here introduced by Mr. Hammond, and explained to the committee.]

Mr. BARBOUR — *Recalled.*

Mr. R. M. MORSE, Jr. — I understood you to say that you expected to take this water either into Fresh pond or else independently, and distribute it?

A. Yes, sir.

Q. Do you calculate that the pumping facilities of Cambridge are sufficient?

A. Yes, sir.

Q. You do not think any additional expense will be needed?

A. As the city grows we shall have to add additional facilities. Our engine-house is sufficiently large.

Q. Supposing you are going to use the Shawsheen water, what do you propose to do?

A. We can take it direct to the pumps. Some plan will be devised, if that is not the best plan.

Q. What I want to get at is this: Suppose you should take the Shawsheen, and decide it to be inexpedient to take it to Fresh pond, would you provide for an additional pump for pumping that water?

A. Not at present. We should use the same pump.

[Report of proceedings of Cambridge, in regard to getting a water supply from Boston, read and handed to committee by Mr. Hammond.]

Mr. R. M. MORSE, Jr. — Where is your communication to the Boston Water Board?

Mr. HAMMOND. — We have to begin with one thing at a time. Sept. 29, 1882, the Water Board started the matter.

JAMES A. FOX.

Mr. HAMMOND. — You are Mayor of Cambridge?

A. Yes, sir.

Q. For how long have you held that position?

A. Three years.

Q. Do you remember the order of the City Council which I have read here?

A. Yes, sir, I do.

Q. Were any proceedings taken by you, as one of that committee, in communicating with the City Council of Boston? If so, state what they were.

A. I communicated by letter, or the committee communicated by letter, and, I think the letter bore the signature of myself and the President of the Common Council.

Q. How soon after this order was passed?

A. I think directly afterwards, within a few days.

Q. Did you hear anything from that communication?

A. I met Mayor Green soon after.

Q. Did you have any communication with him?

A. I did on business concerning other matters. Had some conversation in regard to this meeting—in regard to our request. The result was that a meeting would be appointed, and a meeting was notified for the early days of December. The notice called for a meeting on our municipal-election day. The notice came from the Clerk of Committees; and, on consultation with the committee of Cambridge, I wrote to Mayor Green, begging a delay.

Q. And that meeting did not take place?

A. It was postponed.

Q. Now, have you since done anything about it?

A. There was an order passed, with no day being fixed; and at the beginning of the year I had a conference with Mayor Palmer concerning it.

Q. When should you think that conference was?

A. About a fortnight ago.

Q. And you understand that a meeting is soon to take place?

A. We have two committees waiting, one on this matter and the committee on our bridge matter, and I suggested that both conferences be had on the same day; this was assented to, and I now await notice from the city of Boston.

Q. Do you know whether those proceedings are in good faith, for the purpose of seeing whether we can get a water supply from Boston?

A. I have no doubt of it.

Q. Do you feel safe with the present water supply of Cambridge?

A. I do not.

Q. Whether or not there is a great deal of anxiety on this subject?

A. There is.

Q. Was any copy of that letter preserved?

A. I am not sure.

Mr. R. M. MORSE, Jr. — Do you personally think that if you could make an arrangement with Boston, on advantageous terms, it would be a good way to obtain a water supply for Cambridge?

A. I do not say that I should prefer it.

Q. I asked you whether or not, if an arrangement could be made with the city of Boston, it would be satisfactory to the people of Cambridge?

A. I don't think they would be satisfied with the quality.

Q. Don't you think that the quality of the water which the citizens of Boston exist upon is good enough for Cambridge?

A. I think so.

Q. You don't think there would be any risk in getting your water from Boston?

A. I don't think there would be.

Q. Have you not found a disposition on the part of the city of Boston to meet the city of Cambridge, and arrange proper terms?

A. I could not say.

Q. Have you found any disinclination on the part of the city of Boston to meet you?

A. Not at all.

Q. Were you aware that Boston, two years ago, passed a vote in favor of supplying water to Cambridge, and to such other towns as might apply?

A. I did not know of it.

Q. I understand that no terms were stated?

A. I do not know. I am not aware of any.

Q. Let me ask you this question: Suppose the city of Cambridge to-day had authority to take the Shawsheen, would you not consider it a very extravagant course for the city of Cambridge to take that land and incur the very great expense of building its dam before it had ascertained what it could do with the city of Boston?

A. I don't think we are proceeding in that way.

Q. Supposing you had authority to-day to take the Shawsheen, would you, as mayor, recommend incurring the expense before you had ascertained whether you could get a water supply from Boston?

A. I can answer that in this way: I suppose the city of Boston knows of its present supply; that is, without the additional basins that they are building.

Q. I don't think you are answering my question. It is, whether, if you had authority to take the Shawsheen, you think, as mayor, that you would recommend the incurring of the expense consequent thereon?

A. I have recommended it each year.

Q. Pardon me, that is not the question. My question is, supposing you had authority to take the Shawsheen, would you recommend the incurring of the expense until you had tried whether or not you could get a supply from Boston?

A. I think I should, from my present light.

Q. You would recommend it?

A. I think I should, with my present light. I have some idea of what Boston charges. I have heard of their charges, and I think that matter has been talked over by our committees and by our Water Board, and we generally agree that it is to our advantage, taking into consideration the growth of the city, to get our own supply.

Q. Have you informed yourself from the best source, to wit, the Boston Water Board and the committees of the Common Council, as to what the real cost is?

A. We have tried to do so, and hoped to have it before this hearing.

Q. You have spoken as if Boston was in the habit of making excessive charges.

A. I do not say that.

Q. The charge is higher than you think the city of Cambridge ought to pay?

A. I think it would be better for us to have our own supply, taking into consideration the possible and probable growth of the city.

Q. Supposing they were willing to sell you water at a rate that would be satisfactory to you, would it not be better for you to get your supply from Boston?

A. I do not know. If it is to take a certain percentage of the rates, which I believe is the charge wholesale, it would be cheaper for us to get our own supply.

Q. I don't understand you to say that an appointment had been made with the committee of the city of Boston before this hearing came up?

A. I have striven to have a meeting.

Q. Don't you think that if you were very much in earnest about it you could have succeeded between April, 1882, and February, 1883, in having a meeting with the city authorities of Boston?

A. I don't think I could press it more urgently than I have. I know how it is with Cambridge—January and February are very busy months. I was ready for and desired a conference early in the month of January, if possible, and hope to have it now within a few days.

A COMMITTEEMAN.—Do you think, with your knowledge of the people of Cambridge, that there is ever any possibility or probability of annexation to Boston?

A. You mean to ask me if the people are ever likely to desire it?

Q. Yes, sir.

A. It is not spoken of now as it has been. I don't think that that is a matter thought of to-day. The days of annexation have passed.

Q. Do you think it ever probable that they will wish to be annexed to Boston?

A. I do not think either municipality think of annexation now as desirable. The system of metropolitan districts for sewage and police, and so forth, covers the ground. I think that the people of Boston have settled down to that idea, that whatever we desire we may agree upon.

Q. A certain section would be better supplied under one source of drainage, under one management. Don't you think on the whole it would be better?

A. In the matter of drainage I have my views upon it. On the Cambridge side of the river it must include the towns round Cambridge; in fact, all between the Mystic and Charles rivers. I hardly think annexation would be desirable.

Q. Would it not be desirable to have the system of drainage and water supply under one management?

A. I know our wants, and I am trying to find out the cost of taking the Boston supply across the river through our pipes. We have an estimate as to the cost of bringing the Shawsheen to our city. I am unable, as yet, to say whether it would be better that Boston should supply Cambridge and Arlington, and other towns on our side of the river.

Q. Does it seem to you that here is a section of country which must necessarily come under one system of drainage, — must necessarily come under one system of water supply?

A. Yes; if the system is large enough. The Shawsheen supply we know substantially what it is, and I understand Boston desires it for that portion of their city on that side of the Charles river.

Q. Whether or no it is economical and just for the cities that are lying here upon the coast to pick up in detail the little ponds and little rivers that are in the immediate vicinity to supply them for a short time at the longest, rather than go to the larger supply at once, though at a greater expense, and get water for all time, so as not to interfere with the interests of these smaller communities from which you are now drawing? I ask you your opinion on that subject.

A. I wish we might get an unlimited supply from some source where there would be no question.

Mr. W. G. RUSSELL. — You said, if I understood you, that the day of annexation had passed, and that the metropolitan district system took its place. What did you mean?

A. I speak for our citizens; the very system of police, is, perhaps, an illustration of it. Take the system of police in New York and other great cities; take the city of London, which goes beyond the city itself, it has a metropolitan district system.

Q. Is that not what you referred to?

A. That instead of annexation, — the Legislature has charge of that. The question of drainage has already been before the Legislature.

Q. Will you state whether there is any reason why the system of water supply should not be one of the matters dealt with by such a system?

A. I have answered that. I wish it might be so.

Q. If it is not, is there any reason why annexation should not have some life to it still?

A. It is a question of opinion purely. I cannot answer for others.

A COMMITTEEMAN.—The matter of metropolitan drainage was before our committee last year, and it was a great question, and on account of its greatness we were not able to manage it; but it appeared to the committee that the necessity would come, sooner or later, when there would have to be a metropolitan drainage system for the preservation of the health of the community in this section of the city. Now, I put you the question with regard to whether or no if there was such a metropolitan district, it would not be desirable that the water supply should be under a similar general management? If I understand you, you think it would be desirable? Now, while this thing, in the near future, is a necessity, so far as sewage is concerned, is it not advisable, for the present, that these towns in the immediate neighborhood of Boston should content themselves with taking their water from Boston, rather than to go out on their own basis and obtain water which would ultimately be of great expense to those municipalities, when they would finally have to come into this general arrangement for the supply of water, and come to Boston? Would it not be better to delay a little, to see how this metropolitan drainage scheme is to succeed?

A. I do not think they are connected.

Q. Boston must come for a larger supply, sooner or later, and the Shawsheen is but a drop in the bucket; and, for economy, and a regard for the interests of smaller towns and communities, and that Boston must go, very soon, to some larger source, and should then supply these neighboring towns and cities, both for their sake and your own, thereby compensating yourselves, to some extent, for the cost of supplying the neighboring towns, and going to the Merrimac river and others.

Mr. HAMMOND.—It was agreed that, on account of Mr. Carter's health, the testimony which he gave last year should be received. I do not desire to read any part of it, which is merely cumulative; I simply desire to read a few sentences from the twentieth page of the testimony of last year, quoting that part of it in relation to getting the supply from Boston.

The CHAIRMAN. — Boston could not promise you anything at that time, could she?

A. No, sir; I suppose she was herself lacking water. We could get some from Boston, but the authorities did not see their way to taking the responsibility of letting us have any. I could give ample evidence here, and introduce cumulative testimony; but I do not know of any point which has not been brought up here.

Adjourned to Monday, February 26th, 10 A.M.

Resumed, February 26th, 1883, 10 A.M.

OPENING BY A. J. BAILEY, ESQ., FOR THE CITY OF BOSTON. :

Mr. Chairman and Gentlemen: —

This is the third year that the city of Boston has been before the Legislature seeking to get the water of the Shawsheen; there is nothing particularly new that can be said in the case of Boston. The same state of affairs exists to-day that has existed, and are stated in the case of the city last year. The Charlestown District, Somerville, Chelsea, and Everett, with a population of 85,000 people, are consuming to-day the entire supply of the Mystic system, which is estimated at seven millions of gallons a day, while the report shows that we use seven million two hundred thousand gallons daily.

In 1880 the supply was entirely exhausted, and the pumps had to be put into the Mystic pond to pump the water into the conduit; and there was a time for three months, when, for a part of the city and for a portion of the territory about the city, there was a fear of a water famine, and no earthly chance of getting water from any source. On this account the city was compelled to ask the Legislature to be allowed to take the water from some other source, — and that was the Shawsheen river. That petition was again put in last year, and the committee gave us leave to withdraw. There are some reasons in addition to what were strongly urged last year. I do not propose to go over what I said last year, as those reports are before the committee, and will be considered by it.

You heard the testimony of Dr. Wood, that the supply comes from the upper Mystic pond, which is the lowest basin in the whole system; the result of that is, that the drainage is tending to make the water very impure, and we will be compelled in a short time to give it up. The population of Winchester, Woburn, and Arlington, in which towns this basin lies, in 1860 was between nine and ten thousand; in 1880, eighteen thousand souls. The population has doubled in twenty years. The inevitable result is, that that portion of the sup-

ply must be given up. Efforts have been made by the city of Boston to take away some portions of this pollution by turning away the discharge from some ten tanneries located on one of the tributaries of this basin; but the pollution arising from the soaking of water through ground receiving the sewage of a large and constantly increasing population cannot be guarded against, and we shall, within a short time, be compelled to give up this lower basin, at a cost of one-third of our supply. To make up for this loss there is no place but the Shawsheen to which we can go. I will call Mr. Wightman, the City Engineer, and the members of the Water Board, to show you the needs of our city on this portion of our supply.

HENRY M. WIGHTMAN.

Q. You are the City Engineer of Boston?

A. I am.

Q. Will you state to this committee the amount of water used in 1882 by the public, who consume the water of the Mystic river?

A. I have been here so often that whatever I say will be a duplication. The Mystic supply is upwards of seven million gallons a day. The city of Boston has got to do something in the way of increasing the capacity of that source of supply; that is, the district supplied from it.

Q. That is, increase the water in some way, either by storage on the Mystic itself, or by taking the water of the Shawsheen river?

A. I do not think it would be advisable to supply additional storage in the Mystic valley. Certainly, the water is very much polluted indeed; and the sources of pollution are constantly growing, so that we are reduced to the alternative of providing some other source of supply, which ought, of necessity, to be in that direction, on account of the expense. The Shawsheen presents the best and most desirable place for us to go to for an additional supply. It is a valley that is not likely to be contaminated in the future to any very great extent. There is another thing I would say to the committee, and that is, that the city is now contemplating the supplying of East Boston; and some method of increasing the head must be adopted. There is a great deal of complaint on the whole service, on account of the want of head. The city have got to lay a new main, at a cost of about \$80,000, running across the harbor some thirty-two or thirty-three hundred feet, and, in case of breakage, it would be difficult to get at it. East Boston uses between four and five million gallons of water of the Sudbury. The Cochituate water has a very long reach, and there is some fifty feet head in that supply.

Q. Will you state to this committee the condition of the Mystic supply in 1880?

A. In 1880 we were partially supplying East Boston; the Mystic supply was exhausted for some three or four months, and the supply was dependent upon temporary machinery set up at the lake. That is a very precarious method of supplying a large community like that; in case of fire, and the burning of those pumps, they could not have been replaced in two-months' time. I said that the condition of that district was due to the Mystic supply being exhausted, and it is liable to be exhausted again. When the water is only three or four feet above the conduit we cannot pump it.

The CHAIRMAN. — You do not feel that Boston can supply any other city?

A. I stated last year that the city of Boston could supply Cambridge at that time, having an ample supply near. Fresh pond was not full; we could fill it for them, and then supply Cambridge with water.

A COMMITTEEMAN. — If Boston only had larger reservoirs you could provide against these water-famines?

A. If it could have had larger reservoirs at the Mystic, with a storage capacity of two hundred million gallons. The supply of the Sudbury, last year, was four millions of gallons a day, when the city was using thirty millions. The storage of the Mystic is capable of seven millions, and no more. We are building now an additional basin, which will give us five millions more. After that there is but one other basin that would be desirable. There are several others, but they are not desirable on account of the shallow flowage.

MR. BAILEY. — Now, as to the danger of the Mystic pond becoming polluted; our reservoirs become impure from the number of inhabitants and the manufactories carried on in their neighborhood.

A. It will be impossible to secure the purity of that pond for any length of time. If there should be any epidemic in the Mystic valley I have no doubt that the Mystic supply would be the actual cause of it; and there would be a very strong feeling about it.

The CHAIRMAN. — Do you think, with our rapidly increasing population, it would be safe to trust to the Mystic?

A. No, sir.

MR. BAILEY. — If you had authority to take the Shawsheen, would you recommend to the city the immediate construction of its works, and give up a portion of the lower Mystic?

A. I should say, take the Shawsheen at once.

Q. As regards giving up the Mystic, or a portion of it?

A. I should hardly care to recommend it until the experts had

examined it more closely, and determined that the water is deleterious to health.

A COMMITTEEMAN. — What is the average that you allow for a fire supply in the year? Do you know the real average?

A. No, sir; we do not know anything about it.

Q. You could not give the information in regard to the quantity of water used for fire purposes?

A. It could be obtained from the Fire Commissioners, who keep the number of hours the engines run.

A COMMITTEEMAN. — If you took the Shawsheen, and gave up the Mystic, you would have to go somewhere else — the Shawsheen would not supply you?

A. The Shawsheen is good for twenty millions of gallons per day; we are only using at the Mystic seven.

Q. You are going upon the supposition that you get the whole Shawsheen?

A. Yes, sir; that is what the city has petitioned for.

Q. How does the Mystic appear now with what it was five years ago?

A. I cannot tell you. So far as it appears, it appears fully as good as it was five years ago.

Q. Generally, you think it is better?

A. I think so, fully; last year it was.

Q. That you know of those who drink it? That may be largely due to the fact that they are not aware of that large quantity of sewage, I think below —

A. It is a great deal purer than it was five years ago.

The CHAIRMAN. — Did I understand you, Mr. Bailey, that there were seven tanneries and one glue factory?

A. Yes, sir.

A COMMITTEEMAN. — You have already taken out some of them, have you not?

A. We have taken out ten; I suppose we could take out more.

Q. I do not believe in taking this pond and stream; but if you should need to do it, you could do it?

A. I do not believe that the city of Boston would take the Mystic supply, on account of the expense of maintaining it; and no amount of money could improve it.

Mr. BAILEY. — How many of those tanneries have been taken out?

A. Those at Russell brook have been taken out, and at Abajonna there are some seven or eight more.

Q. The question has been asked, whether you could take care of that sewage or not. How about the trouble of taking care of that? Would you conduct it down into the sewer?

A. We are taking care of it now. We have been obliged to by an Act of the Legislature, — to pump it up into wells, and take care of it, at a cost of \$5,000 a year.

Q. If the city of Boston were willing to take the Shawsheen river, whether or no would you advise the whole of the Mystic, below East Woburn, being abolished?

A. I have not considered it. I should have to consider it before an opinion is given.

A COMMITTEEMAN. — Don't you think it would be economy for Boston to go to the Merrimack river to take water?

A. There is a doubt in my mind whether it would be economy for them to go there. It is doubtful in my mind whether the city of Boston could afford to go there. It would cost thirty millions of dollars. It is a very large sum of money, which the city has to get out of its water-rate, and would materially increase the water-rate to an almost prohibitory rate. I do not think at the present time that it would be good economy for the city to go to the Merrimack.

Q. Is the Shawsheen the nearest source of supply for Boston?

A. Yes, sir; for that portion of the city.

MR. BAILEY. — Whether or no is the increase in the population of these three towns ruining the lower Mystic basin?

A. It is ruining the valley of the Mystic and the adjoining country.

A COMMITTEEMAN. — I suppose you have made measurements of this, so that you can tell definitely how far it is from Boston to the Shawsheen river where you propose to take water, — how many miles?

A. I cannot give you that without reference to my notes. I have made measurements.

MR. BAILEY. — You went over the matter with Mr. Barbour, did you not?

A. Yes, sir.

A COMMITTEEMAN. — How much further would it be to go to the Merrimack river?

A. Mr. Bailey has the report, which will probably give you that distance. It says here: "Conduit, twenty-five miles long, to connect with the city."

Q. You make it twenty-five miles to go to the Shawsheen?

A. This scheme was estimated for the supply of the city; it is estimated to go to Charles river at Watertown. The conduit would be twenty-five miles long if it went to Watertown.

Q. It is twenty miles to Lawrence; if you go twenty miles to Shawsheen you would not go ten miles further to reach the Merrimack. You say it costs how much?

A. The Shawsheen furnishes a good supply ; at the furthest twenty millions of gallons is a very good supply.

The CHAIRMAN. — How much does Boston use?

A. Forty millions of gallons a day. The Mystic gives a supply of seven millions.

Q. When you get to the Shawsheen river, Boston is not any better off than she is now. If you increase the consumption you must increase the supply.

A. The Mystic supply is not over seven millions, and the Shawsheen is good for twenty millions, — a very material difference.

Mr. W. G. RUSSELL. — Are you not mistaken? You said thirty-one millions last year. Did that include the Mystic?

A. No, sir ; Boston proper this year used some thirty-two millions.

Mr. MORSE. — You testified last year, did you not, and that is still your opinion, that sixty gallons a day is a fair estimate?

A. Yes, sir.

Q. And you regard the use of a larger quantity as waste?

A. Yes, sir.

Q. Has there been any reduction in the amount of consumption from last year?

A. Yes, sir.

Q. What is the present rate?

A. The consumption has not been reduced below ninety gallons per day of Sudbury and Cochituate.

Q. You testified last year ninety gallons of the Sudbury and eighty-one gallons of the Mystic?

A. Yes, sir.

Q. You said last year that one-half the entire supply was wasted?

A. I don't think I said one-half.

Q. I understood you to say so.

A. I do not think I said that one-half was wasted.

Q. Well, call it one-third.

A. Yes, sir.

Q. Is it not your judgment that, by a proper system of meterage, or in some other way, the consumption could be reduced to sixty gallons *per capita*?

A. Yes, sir.

Q. At sixty gallons *per capita*, five hundred thousand people would use thirty millions of gallons a day?

A. Yes, sir.

Q. What is the population of the entire district?

A. Four hundred thousand.

Q. How many years will it take, in your judgment, to reach eight

hundred thousand, taking the average increase for the last twenty years?

A. Thirty or forty years.

Q. Call it thirty years, a population of eight hundred thousand souls, using sixty gallons a day, would be forty-eight million gallons a day. Does not your present system supply fifty millions a day?

A. For all basins.

Q. Could not the Sudbury be made to develop its entire capacity?

A. It has been estimated that the Sudbury would be good for forty millions, and the Cochituate would be good for twelve.

Q. That would be fifty-two millions from the Sudbury and Cochituate alone, without the Mystic?

A. Yes, sir; sixty gallons a day *per capita*, I think, is ample supply for the city of Boston. We had a consumption once that came to a hundred gallons a day; but we reduced it to sixty, and it can be done now.

A COMMITTEEMAN. — What do you think it is now?

A. Ninety.

Mr. MORSE. — When was that, that the consumption was a hundred gallons a day?

A. In 1864-5.

Q. How many of the additional basins that would be needed to hold this supply of fifty-two millions of gallons are in process of construction?

A. Four basins.

Q. You have one basin in process of construction?

A. Yes, sir, — No. 4.

Q. There are three that you have been authorized to build?

A. Yes, sir; one at Marlborough, and two small basins in addition to the four.

Q. And when these basins are built the city would then have a supply, in your judgment, of fifty-two millions of gallons a day?

A. Yes, sir; outside of the Mystic.

Q. Your present supply from the Mystic is seven millions a day?

A. Yes, sir.

Q. What, in your judgment, would it be increased to, provided they built additional basins?

A. Twelve millions, provided you built all the basins.

Q. Is that estimate based on the same yield from the rainfall on which you have based the estimates as to the Shawsheen?

A. No, sir.

Q. Then you estimate that by building additional basins on the Mystic you will get twelve millions there?

A. Yes, sir; that is the estimate.

Q. That would be good for fifty years to come?

A. Yes, sir.

Q. In regard to the quality, I understand you to say that the Mystic supply is not good as to quality?

A. I do not think I made that statement.

Q. Do you wish to be understood as saying it?

A. No, sir; I do not. I am not a chemist. The water has been recently chemically examined, and I should not care to give an opinion without hearing the result of that examination.

Q. Under what authority, or at whose request, do you appear here?

A. At the request of the Water Board and the City Solicitor.

Q. Why don't the Water Board come here?

A. I wish you could find out. I cannot.

Q. Does the present government advocate this movement to get water from the Shawsheen?

A. I cannot say. I do not understand that they have taken any action.

Mr. BAILEY. — They ordered him to be here. If the city did not want anything done, they would take some notice of it.

Q. You never saw any member of the Water Board here, did you?

A. No, sir.

Mr. BAILEY. — They will be here when wanted.

Q. You testified last year, if I remember rightly, to the amount of water that could be supplied from the pipe that connected Boston with Cambridge?

A. Yes, sir.

Q. You said that you could supply Cambridge with a million gallons a day?

A. I think I qualified that by saying, if the waste was reduced.

Mr. W. G. RUSSELL. — I call the attention of the committee to page 81 of the testimony of last year.

Mr. MORSE. — You do not modify your opinion, as stated last year?

A. No, sir.

Q. One million gallons is a small amount compared with the amount required for Boston proper?

A. It is a very small amount if we stop the leaks.

Q. In respect to the use of the Shawsheen your plan contemplates taking the entire river, does it not?

A. Yes, sir.

Q. You do not consider it economical for a city to build a dam, and waste ten to twelve million gallons a day?

A. No, sir.

Q. Would you consider it any object for the city of Boston to

accept a bill from the Legislature which would authorize you to take twelve millions, and let eight millions run down the dam?

A. I do not think it would be an object.

Q. On page seventy of last year's report, I asked you this question : " I understand Mr. Wightman to say — and I will put the question again so that there may be no mistake in regard to that — that he does not think it would be profitable, either for the city of Cambridge or the city of Boston, provided it was to build this one dam, and guarantee ten million gallons a day to run over there ; " and you answered, " I do not think it would. Of course that is a matter about which each city must judge for itself ; but I should not recommend any such scheme to the city of Cambridge, if they should consult me as an engineer."

A. I did not express any opinion about the city of Boston then, and should not care to do so now, without going into more figures.

Q. Let me ask you this question as regards the city of Cambridge : Have you any doubt that it is more for the advantage of the city of Cambridge to take ten million gallons from the city of Boston than it is for the city of Cambridge to take the Shawsheen, build a dam, and let twelve million gallons flow down over the dam?

A. That is hardly a fair question to ask me.

Q. I am asking you as an expert.

A. I am not here as an expert, and not receiving the pay of an expert.

A COMMITTEEMAN. — I understand that the Water Board did tell you to come here.

A. Yes, sir ; they expected me to come, and the matter has been talked over. I do not know as I can say they directed me to come here ; they did not send me any formal notice to come here.

Q. Do you understand that the present Water Board is dissatisfied with the present water supply?

A. It is on their recommendation that the city put in a petition to take the Shawsheen for a water supply. I do not think there is any doubt about the position of the Board on the question.

Q. Are you satisfied that the water supply that you would get from the Shawsheen would be sufficient for all future purposes for the city of Boston and Cambridge?

A. Take Somerville, Everett, and Chelsea, I think that the supply from the Shawsheen, with the supply from the Mystic, would be an ample supply for that section, that is, East Boston, Chelsea, Everett, and Somerville. I do not know that Cambridge is using more than one million gallons a day, what they are getting now, one million gallons from Fresh Pond, and I am speaking of one million gallons in addition to that.

Q. The flow of the Shawsheen river would be an ample supply for all time for the city of Boston?

A. I think not. I think the city of Boston will eventually want all the supply they can get.

Q. When you are speaking about a series of years, you do not favor using the present Mystic pond, and you did when you were speaking about the possibility of its becoming impure in the course of five years?

A. I don't know what you base that statement on. I calculate we will probably have to use the Mystic for the next three years.

Q. Suppose the Mystic is given up in three years; then would the Shawsheen river, provided Cambridge takes what they propose to take out of it, — would that give you a supply for any considerable time?

A. That district is not increasing very rapidly. In fact there has been a slight decrease.

Mr. R. M. MORSE, Jr. — What has been the total cost of the Mystic supply up to the present time?

A. \$1,614,000, up to May, 1880.

Q. Does that include the land damages?

A. Yes, sir; includes them all.

Q. How much has been spent since May, 1880?

A. That I could not give you without reference to the report.

Q. What was the cost of the Sudbury and Cochituate?

A. \$16,703,000, up to January, 1881.

Mr. HAMMOND. — Does that include the interest on the original cost?

A. The total cost of the work, whatever has been charged to it, — the original cost, of course, — the income from the water pays the interest.

Mr. R. M. MORSE, Jr. — How much of that expenditure, which has already been incurred on account of the Mystic, would be thrown away if the Mystic system were abandoned?

A. About \$200,000; if you put in the Mystic-valley sewer, also, it would be \$300,000.

Mr. HAMMOND. — If I understand you, Boston draws now twelve millions from Cochituate, twenty millions from the Sudbury, and seven millions from the Mystic?

A. Yes, sir.

Q. That the Mystic is used up, and the thirty-two millions which you got from the Cochituate and Sudbury were substantially used up last year?

A. Yes, sir.

Q. That Boston now uses all its supply?

A. It does.

Q. That you are now constructing Basin No. 4, which will yield how much?

A. Five million gallons a day.

Q. That is the only provision you are now making for an increased supply?

A. I cannot answer that question. The Water Board have the right to spend a considerable amount of money for more water.

Q. And it is your opinion that the remaining basins on the Sudbury are of a more objectionable character than those which have already been constructed?

A. One of them is; the largest, — Marlboro' basin.

Q. How deep is that?

A. The average not more than fifteen feet.

Q. It is an objectionable basin on account of the depth, is it not?

A. Yes, sir.

Q. That basin would give you how much water?

A. About five million or six million gallons. The quantity of water to be stored depends upon the water-shed. If your water-shed will furnish five million gallons you do not need to store.

Q. You believe this eight-hundred-acre Marlboro' basin will give how many gallons a day?

A. Between five millions and six millions.

Q. If you build the Shawsheen dam, you believe the result will be twenty millions from the same acreage?

A. That is believed will be the result.

Q. Boston, to-day, is using up all the water that it gets from all its sources of supply?

A. Yes, sir.

Q. And you are now constructing something which will give you five millions more, and that is all you are constructing?

A. Yes, sir.

Q. If there is no reduction in the supply, and no change in your methods of use, you will be in no condition to supply Cambridge, will you?

A. We will give them all the water they want in the spring.

Q. I mean in the dry time?

A. No.

Q. Do you remember when Cambridge made application in 1880?

A. Yes, sir.

Q. Do you remember that you were not in condition then to supply anybody?

A. I do. We should have supplied them, however, if there had been a case of emergency. We should have been willing to divide what we had.

Q. Now, under the present circumstances, in another dry time, is it likely that Boston would be in any better condition than in 1880 to supply Cambridge? I mean before you get that basin constructed.

A. No, sir; not unless they reduce the consumption.

Q. At the present rate of consumption do you consider it reasonably necessary to have this basin, No. 4, for the use of Boston?

A. If I understand the question —

Q. I will put it in this way. At the present rate of consumption do you believe that the water of that basin will be used by Boston?

A. Yes, sir.

Q. Now, do you know of any means that Cambridge has to make the people of Boston use less water?

A. No, sir.

Mr. BAILEY. — When you speak about giving up the Mystic, if I understand your previous reply, you intend to give up only a portion of it?

A. Yes, sir.

Q. One other question, Mr. Wightman: suppose that the city of Cambridge desires the water, and must have it; suppose that Boston won't sell water to her at a cost less than what she can get the Shawsheen for, would there be anything extravagant in Cambridge going to the Shawsheen?

A. No, sir.

Q. And your statement, that it would not be an economical means for getting water for Cambridge to go to the Shawsheen, is not quite correct, is it?

A. I did not say it in that way. I said that it would not be an economical measure if they were going to allow ten million gallons to run down the river.

Q. I thought you could not have meant that.

A. I don't know anything about it, — whether Cambridge can afford to go there or not.

A COMMITTEEMAN. — You are speaking about being in process of building a new basin, and that you would not be able to supply Cambridge until this basin is finished. Do you think it is going to take as long to build this basin as it would for Cambridge to go to the Shawsheen?

A. We calculate to get that basin completed next winter.

Q. It would take three to five years before Cambridge could use this water?

A. I should think so; three to five years.

Mr. HAMMOND. — If Cambridge wants the water, and has made up

her mind that she ought to have it from the Shawsheen, there is no time to lose, is there?

A. No, sir.

Mr. W. G. RUSSELL.— You attended the last investigation of the commissioners, and testified, did you not?

A. Yes, sir.

Q. When did they get through with that investigation?

A. I do not know; the report was put in only a few weeks ago.

Q. You were a witness, and attended the hearings, did you not?

A. Yes, sir; I did.

Q. The subject of flowing basins, without removing the vegetable matter and soil in the basin, was very fully considered, was it not?

A. Yes, sir.

Q. And the result reached by that Commission was, that it was unsafe to construct any basins for a water supply for domestic purposes without removing the entire soil?

A. I rather question that word "unsafe." I don't think they used that.

Q. That is the result they reached, — that a basin should not be constructed without doing that. I asked you to make a computation of the cost of removing the entire soil, estimating it two and one-half feet deep over an area of one acre, for the Shawsheen basin?

A. Yes, sir.

Q. You did that?

A. I made some rough figures.

Q. What are they?

A. \$600 to \$800 per acre.

Q. In making that estimate what distance did you estimate that the material was to be carried?

A. Not conveying it more than one thousand feet from the point of removal.

Q. There was some estimate made of the cost of removal of the soil in the Sudbury basin, and of removing it to the park, what was the cost of that?

A. \$1.00 per yard.

Q. Is there not some plan being considered of connecting the Sudbury with the Mystic?

A. Yes, sir; by a pipe.

Q. And the objection is that it would cost \$400,000 to \$500,000?

A. Yes, sir.

Q. Any other objection that you know of?

A. It depends upon the sense in which you use the word objection.

Q. Any engineering objection?

A. It depends entirely upon what you propose to use that connection for.

Q. Suppose you use it in connection with the Mystic?

A. None except its cost.

Q. That is the only objection that has ever been stated, is it?

A. Yes, sir.

Q. Have you any doubt as to the quality of the water, — that the water in Basin No. 3 will be proper water for use in three years?

A. We are using it now, and it is objected to. We should have waited three years.

Q. Have you any doubt that it will become proper water for use?

A. The objection, and the only objection, to Basin 3 is the *algæ*, nothing more. When that is contaminated it is contemplated to have an additional supply to use from another basin.

Q. Marlboro' basin has an average of fifteen feet depth?

A. I gave you that roughly.

Q. How about Whitehall basin, — you are not using that now?

A. No, sir; the city does not need it.

Q. What is the average depth?

A. Fifteen to twenty feet.

Q. What is the area?

A. Six hundred acres.

Q. What is the capacity of that basin?

A. It is good for five millions.

Q. You have said that the present sources are not sufficient for all time. Has there not been a provision made for taking from a different quarter than that you are now taking from, or seek to take from?

A. Yes, sir.

Q. You built the Sudbury conduit to Chestnut Hill, — what size is it?

A. One hundred and ten million gallons.

Q. It is connected with the Sudbury river and Chestnut-Hill reservoir?

A. Yes, sir.

Q. It is constructed so as to take the Charles river, if necessary?

A. Yes, sir.

Q. What is the flowage of the Charles river?

A. About the same as the Sudbury river.

Q. Now, beyond that, what is the supply of the Merrimack, — is it not practically an inexhaustible supply?

A. Not so far as the mills are concerned.

Q. It runs one billion a day, at its lowest?

A. Yes, sir; away beyond the wants of any city or community anywhere near it.

Q. In regard to the reduction in the consumption of the water, if I understand, a reduction was actually accomplished in one year reducing the consumption from ninety to sixty gallons?

A. I think it was one year, by inspection.

A COMMITTEEMAN. — What would be the cost or expenses of going to the Merrimack, if you wanted to get a supply from that quarter?

A. The works would cost about \$13,000,000.

Q. You have already expended on the Sudbury and Cochituate \$16,000,000?

A. Yes, sir.

Q. Coming to the question of the reduction in the use, is it not true that in the Charlestown district, by the use of the Deacon metre system, you reduced it to thirty-six gallons a day?

A. I do not recollect the exact figures; we reduced it thirty-five per cent., and on ninety gallons that would be thirty-six to forty gallons. I can tell you by referring to the Water Board report.

Q. Do you know any reason why, with proper care, the consumption in the city of Boston cannot be reduced again to at least sixty gallons?

A. No, sir; I do not.

Q. Can it be reduced below that?

A. Not in my judgment. You must take into consideration fifteen gallons a day for manufacturing purposes.

Q. Supposing the city of Boston should receive permission from the Legislature to take the water of the Shawsheen, how soon do you think the city of Boston would authorize the beginning of the work?

A. I think the work would be begun within a year. There is a great deal of feeling in East Boston about turning them on to the Mystic, and we have to get the water from some other source.

Mr. W. G. RUSSELL. — In your own view is there any objection to carrying the water from the Sudbury over to East Boston, as you do now?

A. There is always an objection to carrying a pipe across the water, for the reason that you cannot get at it readily in case of a break.

Q. Then you made a mistake, or somebody made a mistake?

A. Nobody made a mistake.

A COMMITTEEMAN. — Which water do you consider the purest, Cochituate, Sudbury, or Shawsheen?

A. Lake Cochituate.

Mr. POOR. — If the city of Boston could get an unlimited supply of water from the Merrimack, at a point within thirty miles of Boston, would you think it advisable to go to the expense of doing it?

A. I should not.

Q. Do you think it would cost \$13,000,000 to take the water from the Merrimack?

A. No, sir; would not estimate it at less than \$50,000,000. You would have to build your works in accordance with the requirements.

Q. Have you ever considered the feasibility of taking water from the Merrimack below Lawrence?

A. No, sir. That is purely a matter of opinion however, not based upon any investigation; only an opinion based on information obtained from the reports. To answer the question intelligently it would require an investigation, which I have not made. The Merrimack river now is a very muddy, dirty water. It has got to be settled.

Q. Any more dirty than these other streams?

A. Decidedly it is. The banks carry a fine mud. The city of Lowell filters the water.

Mr. RUSSELL. — They get good water?

A. I believe so.

Mr. POOR. — Do you know whether it is all filtered?

A. No, sir.

Q. Does the city of Lawrence take its supply from the Merrimack?

A. I believe they do.

Q. If you could get a supply from the Merrimack, would it not be the cheapest way of getting an additional supply for your Mystic system?

A. I do not think so; always qualified by the opinion I gave in the beginning.

Mr. BAILEY. — What is the number of Marlboro' basin?

A. No. 8.

Q. That is eight hundred acres in extent?

A. Yes, sir.

Q. What is the character of the bottom?

A. Ordinary farm-land.

Q. What would be the cost of clearing that out?

A. I based them all the same.

Q. And you get a storage capacity of how much?

A. Five million gallons.

Q. In view of the fact that Marlboro' is just introducing the water, and building a drainage system, would you ever recommend the building of that basin?

A. I don't think I should.

A COMMITTEEMAN. — Is not a portion of this waste that you speak of, — is not a large portion of it occurring in cold weather, to prevent the pipes from freezing?

A. There is a large amount of waste in cold weather. In the

sixty gallons I have allowed for that waste, which I think is unavoidable.

Q. That is not waste where the water is allowed to run to prevent the pipes freezing. The waste you speak of is from some other cause?

A. Yes, sir. There are nine months in the year that we can reduce the consumption to forty-five gallons a day.

Q. I notice that, although you have an ordinance that no water is to be allowed to be run to prevent the pipes from freezing, you actually save by the operation?

A. Yes, sir.

MR. TIMOTHY T. SAWYER.

MR. BAILEY. — How many years were you a member of the Mystic Water Board?

A. Three years.

Q. You are also a member of the present Water Board?

A. I am.

Q. What is the opinion of the Water Board for having the waters of the Shawsheen river?

A. I can simply state my own reason for appearing as a witness. I was on the Water Board for three years, and I have been on it the last time only a few months. The first three years were taken up in settling land claims. Since I have been back it has seemed to me that provision ought to be made for an additional supply of water, and I joined in the petition for the reason that the Mystic system ought to be increased, because, during the past year, the supply of water has been troublesome in this respect. At times we supposed we should not have a sufficient supply of water. A recent investigation into the subject of water-basins seems to be conclusive that the basins should be prepared somewhat differently from what they have been before. The basins contemplated to be built on the Mystic were shoal; and for the reason that I have supposed the consumption of water would be increased on the Mystic system, it seemed to me, looking to the future, that we ought to ask for power to take an additional supply of water, and the Shawsheen seemed to me the most advisable source.

MR. R. M. MORSE, JR. — You have been on the Board, as I understand, only during last year?

A. Since last May.

Q. You were not a member of the Board when its last report was given to the city?

A. No, sir.

Q. Your associates have been there for a good many years, have they not?

A. Yes, sir.

Q. Do either of them propose to attend this hearing?

A. That I cannot say.

Q. Are you familiar with the report made last year?

A. I have read it over carefully.

Q. I want to call your attention to the sentence on page seven, — “Speaking of the Mystic water, the quality of the water has been unusually good.” Have you seen any reason to change that opinion?

A. I believe that is the fact, — the quality of the Mystic for the last two years has been very good.

Q. And very much better than it was five years ago?

A. Yes, sir.

Q. You live in Charlestown, do you not?

A. I do.

Q. Is there any objection to the Mystic water at the present time, that you know of?

A. For the last two years it has been good.

Q. If it keeps as good as it is now, is there any reason, in your judgment, why, in the next five years, it would not be fit for use?

A. No, sir; if it keeps as good as now.

Q. In regard to the quantity, the present supply from the Mystic is about how many gallons?

A. I think this season it is between six and seven millions.

Q. What do you suppose the entire capacity of the Mystic system would be?

A. I cannot tell you positively as to that. The old Water Board employed Mr. Doane, and the city of Boston employed Mr. Fteley, and they agreed that the capacity would be about seventeen millions.

Q. I believe there has been some difference in the estimate of this. Mr. Wightman’s estimate is twelve millions, and Mr. Kirkwood and Mr. Francis give it at seventeen millions.

A. The result of the investigation was fourteen millions.

Q. Well, then, as at present advised, the Water Board understand that they can get seventeen millions from the Mystic?

A. Yes, if they build additional storage-basins. It would be unwise to build the main basin, at least the one they propose to build on the Abajonna. The water is so shoal there that it seems to me it would be hardly wise to build it. They propose to raise Horn pond to six feet.

Mr. BAILEY. — Do you think that would be advisable?

A. I cannot say. On account of the *algæ* the water in Horn pond, some two years ago, was very bad.

Q. In case you do not build the large basin, to what extent do you think the supply would be reduced?

A. Mr. Wightman could give you an opinion on that better than I could. I can only give you the size of the basins to be built. I think there are only two basins which it would be wise to build at the upper end of the Abajonna.

Q. Can you give us an idea of how the supply from the Mystic would be affected, supposing you built those two additional basins?

A. I cannot.

Q. You understand that from the Cochituate and Sudbury you could get a supply of fifty-two millions from the basins you can build there?

A. Yes, sir; forty millions from one, and twelve from the other.

Q. You consider by building those basins, if you could connect the two systems, you would have an abundant supply for a long time to come, would you not?

A. Yes, sir, if you could get the full capacity of all the storage-basins built.

Q. I wish to call the attention of the committee to page 7 of the report of last year, where the consumption of several cities was given. Do you say that a supply of sixty gallons *per capita* is a large supply?

A. I think it is. I think that measures ought to be taken to stop the waste, and measures are being taken to stop the waste.

Q. To what fact do you attribute it, Mr. Sawyer, that in the city of Boston there has been a greater waste than in almost any American city?

A. To defective plumbing and wilful waste.

Q. Do you think that the plumbing in Boston is any more defective than it is in Lowell, Lawrence, and Cambridge?

A. I do not know. In Providence, the consumption is not over forty gallons.

Q. Supposing it to be not over forty gallons, that is only two-thirds of the amount you allow Boston?

A. Some addition to twenty-five.

Q. Lawrence gets its supply from the Merrimack, does it not?

A. Yes, sir.

Q. Its supply is practically unlimited, and the water allowed to waste, yet their consumption is only forty-four gallons?

A. Their plan is different from that adopted in Boston. But my opinion is that sixty gallons a day for Boston is too large. In addition to Boston proper we supply Somerville, Chelsea, Charlestown, and Everett. There are a good many buildings in those towns; a large number of those houses are made of wood, and are very much exposed, and their consumption will almost double that of the more

sheltered houses, for the reason that they let the water run at night to prevent the plumbing from freezing.

Q. Do not those conditions hold in these other cities?

A. I cannot tell you.

Mr. W. G. RUSSELL. — Is it true that the consumption is much greater in the part of the city where you have those cheap houses than it is in the city proper where you don't have those cheap houses? Boston is using ninety gallons, and that district is using forty-five gallons.

A. I cannot tell. I believe too much water is used, and there should be a closer inspection.

Mr. MORSE. — You think, as a matter of economy for the city of Boston, it would be better to spend its money in applying the Deacon metre and establishing a closer inspection of houses, than in getting additional water supplies?

A. I think they should adopt that first.

Q. Do you think that the city of Boston ought to go into the construction of a more extended water supply?

A. Looking at the future, I think the city of Boston should make application for the water which they think they may need before long.

Q. Has the present Water Board taken any action looking toward the taking of the Shawsheen?

A. I have heard an opinion.

Q. Are you prepared to state to this committee to-day that there is any probability that the city government would go to that expense?

A. No, sir.

Q. Are you prepared to say that the city would incur that expense if a bill were passed?

A. In how soon?

Q. Within the next two or three years?

A. Yes; for my experience all these dry seasons has been such that the Board have felt that we might be short of water when we don't expect.

Q. You know perfectly well that if you cut down the consumption to anything like a reasonable rate, which you think ought to be adopted, that you have got plenty of water with your present system?

A. If the consumption were gradually cut down, and it cost less a year, I think that we could keep it down.

Q. Is it not true that it was reduced at one time?

A. I believe it was.

Q. How long a period was that?

A. I forget, if I ever knew.

Q. You said, a moment ago, that if they ever adopted a system by

which they could curtail the consumption, you thought they could keep it down?

A. Yes, sir; I say so now.

Q. You know that it was cut down once?

A. That was before my time; that was in 1860. I don't think the decreased consumption lasted.

Q. Don't you think there is a much stronger public opinion in Boston in favor of economy in the use of the present water supply than in favor of building any new water supplies?

A. I wish I could feel that in the city of Boston there was a feeling that less water could be used.

Q. Do you think there is any public opinion in Boston in favor of taking this new supply from the Shawsheen?

A. I think there is.

Q. Do you believe if the city of Cambridge had not put in a petition here last fall your Board would have put in a petition?

A. I do not know as to that. The question came up this year as to whether we should not put in a petition to the Legislature to take the waters of the Shawsheen.

Q. Suppose you got an act passed this year, how long would it be before you took the waters of the Shawsheen?

A. I cannot say. When this question came up, my judgment was formed from the fact that the proposed basins on the Mystic system were not desirable, and that it would be unwise to build them, and that the Mystic system could not be increased much until the city was authorized to take the water of the Shawsheen, and it seemed to me proper that the city should make the application to control that stream for the purpose of supplying that section of the city.

Q. Has your board received any communication from the city of Cambridge in reference to supplying that city with water?

A. Not that I am aware of.

Q. Do you know of any reason why the city of Boston cannot furnish a supply of a million gallons a day to Cambridge?

A. At times they can furnish a good deal more.

Q. At sixty gallons a day, for a population of four hundred thousand, it would require only twenty-four million gallons a day; and you are getting from your supplies to-day how much?

A. I think we have used, from the Sudbury and Cochituate, thirty-two millions.

Q. If you cut down your supply to anything like sixty gallons per day, you would have enough to supply the present district and a million to spare for Cambridge?

A. I think so.

Q. And, in addition to that, your new basin, which in a few years is going to give you five millions more?

A. Yes, sir.

Q. Do you know of any objection to Boston supplying it, or any unwillingness on the part of Boston to supply Cambridge?

A. No, sir. But we are liable to have any of these basins shut off.

Q. It would be much better for the city of Cambridge to get her supply from half-a-dozen basins, than to run the chance of getting a supply from the Shawsheen alone?

A. That is a question of chance alone. As I was going to say, the Chestnut-Hill basin — the largest one — was shut off six months on account of the condition of the water.

Q. You are aware that the committee of last year reported that no bill should be passed giving Cambridge authority to take the Shawsheen until some effort had been made to get from the city of Boston a supply of one million gallons a day?

A. I believe so.

Q. Do you think that anybody objects to supplying water to Cambridge?

A. I think Boston would be willing to furnish Cambridge with water; but if your question is whether Boston would make itself liable to supply Cambridge, at all seasons, with water, I think I would not advise it.

Q. You are actually drawing from your two sources thirty-eight or thirty-nine million gallons a day; and you believe, by proper care, that the whole district can be supplied with water, — the whole district could be supplied with twenty-four millions a day?

A. My opinion is that measures ought to be taken to check the waste.

Q. By whom?

A. By the city of Boston. There was a proposition before the City Council last year to supply the Deacon metre.

Q. Supposing that the consumption of the city of Boston were reduced to the point that you consider reasonable, which would be twenty-four millions, you would have fifteen millions more than would be needed?

A. Yes, sir.

Q. Would there be any objection, under those circumstances, to supplying Cambridge?

A. If we have had our full supply I see no objection to it. If the consumption could be reduced to sixty gallons a day, and we could be sure of our supply holding out, I see no reason why we should not supply Cambridge.

Q. I want to ask you now whether you know anything about the

terms upon which Everett and Chelsea have been supplied with water?

A. Yes, sir; there are contracts for supplying those places with water. Chelsea furnishes her own pipes.

Q. At what rate did it supply the water?

A. The inhabitants paid their rates into the treasury of the city of Charlestown. Out of that amount of money collected the city of Charlestown paid back a certain percentage, dependent upon the quantity of water used, in some cases 15 per cent., and it run up to 40 per cent.

Q. Those contracts were made by the city of Charlestown. What time had they to run?

A. Until the Mystic works were paid for.

Q. Have you ever considered what would be a reasonable price at which to supply the city of Cambridge with water? Nothing to be done except to let the water run through the pipes?

A. Never thought of it.

Q. Has your Board ever been called upon by the Water Board of the city of Cambridge?

A. Not since I have been on the Board.

Q. How long have you been back on the Board?

A. Since first of last May.

Q. Has any arrangement been made by the city of Cambridge for the city of Boston to supply it with water?

A. Not that I know of.

Q. About those basins on the Mystic river, — the original plan was to have the small basins on the upper branch?

A. Yes, sir.

Q. Take the Richardson mill-basin, — how large was it to be?

A. Three hundred and twenty-three acres — average depth six feet.

Adjourned to 10 A.M., Feb. 27, 1883.

Resumed Feb. 27, 1883, 10.30 A.M.

MR. TIMOTHY T. SAWYER. — *Continued.*

MR. W. G. RUSSELL. — What storage are you using on the Mystic to-day? What basins?

A. We are using the upper Mystic pond and Horn pond.

Q. You are at present using Horn pond and the upper Mystic pond? Have you not discontinued Horn pond?

A. We have not discontinued Horn pond. It was discontinued last year on account of the drought.

Q. How large is the upper Mystic? It is the Mystic lake, is it not?

A. Yes, sir.

Q. That is put down as having a storage capacity of three hundred and eighty millions. Is that the fact?

A. That is the fact.

Q. What other basins are there on the upper Mystic which you say you can use?

A. In order to make out the quantity of water which Mr. Fteley and Mr. Doane think could be supplied from the Mystic, which is seventeen millions, there were six basins. Two small basins at the upper end of the Abajonna, one large basin between Richardson's mill, a basin between Mystic pond and Horn pond, and another small basin.

Q. Have you raised Horn pond six feet?

A. No, sir.

Q. What was the reason of that?

A. The water has been bad.

Q. Is it deep or shallow?

A. Deep in some places and shallow in others.

Q. The difficulty is *algæ*, is it not?

A. The difficulty is on account of the *algæ*.

Q. Is that attributable to the shallow water?

A. That is the generally received doctrine. I think it is.

Q. If you raised Horn pond six feet it would make more or less shallow flowage?

A. That I am unable to tell you.

Q. Now, take the Richardson basin. That is a large one, is it not?

A. Yes, sir.

Q. What is the objection to constructing that?

A. I understand it is a shoal. There are fifty-five acres, I think, less than five feet deep.

Q. How many acres in the whole?

A. Three hundred and twenty-three.

Q. Of which fifty-five acres is less than five feet deep?

A. Yes, sir.

Q. Do you know what the average depth would be?

A. I do not. Mr. Wightman, in his report, states general depth in the upper part of this basin to be six to eight feet; in the southerly part, sixteen to eighteen feet; and fifty-five acres of a depth less than five feet.

Q. And that is one-sixth of the entire acreage?

A. Yes, sir.

Q. Is there one basin which you have got where the average depth is six feet?

A. I think there is.

Q. Suppose a basin averaged ten feet, wouldn't one-sixth of it average under five feet?

A. Yes, sir; I suppose that is so.

Q. How do you make out that there is an unusually large proportion of shallow flowage in the Richardson basin?

A. I might say to you that my inquiry about these basins is very general, and I don't, of course, keep exactly in my mind the depth of these basins; but I think the storage capacity of the Richardson is eighteen hundred millions.

Q. What is the storage capacity of that basin?

A. I made a few memoranda, but I do not think I have the storage capacity of the basin. It is three hundred and twenty-three acres. The capacity is large, of course, and, unless it is in this report, I cannot answer the questions in regard to the storage capacity of any of these basins. The total capacity of all the basins is estimated at one hundred and thirty-seven millions six hundred and thirty-seven thousand and sixteen.

Q. The storage capacity of the Richardson basin you think would be one billion eight hundred millions of gallons?

A. Yes, sir.

Q. At any rate it is more than one billion?

A. Yes, sir.

Q. There is no objection to the upper basin?

A. The expense would be too great for the capacity. They are small in comparison with the expense that would have to be incurred in their construction. I have a memorandum here of the cost of these basins. One of them cost \$74,000, and the other \$93,000. The capacity is quite small.

Q. What is the capacity of the two numbered 4 and 5?

A. One hundred and fifty millions for No. 4, and a hundred and twenty, perhaps, for No. 5.

Mr. HAMMOND. — Your connection with the Water Board, the last time, began May last, I believe?

A. Yes, sir.

The CHAIRMAN. — I would like to ask whether the drift of the evidence which you are getting from the witness now is not already in print?

Mr. HAMMOND. — None of it, as I understand.

Mr. W. G. RUSSELL. — The sole claim of Boston is, that it should be allowed to take the Shawsheen to supplement the Mystic. The Mystic is giving seven millions of gallons, and they are using it.

The testimony is in that that river is capable of producing, by reservoir, twelve to seventeen millions. I am endeavoring to show why that capacity is not being used; and, as I understand the witness, the Richardson reservoir is one which is capable of holding one thousand millions of gallons. There are two small reservoirs in addition to that, to which there is no objection except the expense, which would store one hundred and fifty and one hundred and twenty-five millions of gallons, respectively.

Mr. RUSSELL. — With regard to Horn pond, how much storage capacity, — how much of an addition would that be?

A. Seventeen feet. I do not think I can give you the capacity of Horn pond.

The CHAIRMAN. — The committee do not care to go over the ground of the evidence offered before the committees during the last two years, if it is already in print.

Mr. RUSSELL. — I do not think you will find any of that testimony already printed.

Mr. HAMMOND. — Was the water short in Boston in September last?

A. Yes, sir.

Q. Will you look at that notice, and say whether you have ever seen a similar notice, and whether it was issued by the Water Board, or not?

A. Yes, sir; I have seen such notice.

Mr. HAMMOND. — I desire to read the notice. It is as follows: —

SPECIAL NOTICE TO WATER-TAKERS.

OFFICE OF THE BOSTON WATER BOARD,

Sept. 5, 1882.

The continuance of the drought is telling very unfavorably upon the water supply. The streams running into the basins and lakes are so reduced that they are now contributing but a very small proportion of the water used in the city, and the Water Board have felt it to be their duty to take measures to reduce the consumption as much as possible.

As a first step in this direction they shut off the fountains, and endeavored to prevent excessive use through hand-hose, lawn-sprinklers, etc. They now feel obliged, for the first time, to exercise the right reserved under the rule granting the use of hand-hose, and which is printed on the back of each bill, to stop entirely the use of hose until the drought is broken and the supply replenished.

On the 28th of August the City Engineer reported only about forty days' supply in sight on the Sudbury and Cochituate and the Mystic works, and seven days of the forty have since passed without any rain to increase the quantity in store.

The Board regret the necessity which compels them to report a deficiency in the water supply. They wish it was in their power to meet every want as to quantity and quality; but they have to deal with facts, and the unusual drought

and inordinate use have occasioned a state of things to which they now call special attention.

They respectfully ask all water-takers to realize the effect of the long-continued drought, and, until we have many days of rain, to be as sparing as possible in the use of water, and to stop, at least, everything like extravagance and waste.

By order of the Boston Water Board,

LEONARD R. CUTTER,
Chairman.

Q. Do you know whether any notice similar to that was issued last year, either before or after this notice?

A. No, sir; I think no other public general notice of that kind was issued.

Q. So far as you know that notice represented the condition of things at the time it was issued?

A. Yes, sir; that was issued upon the notice received from the Engineer, that the water was lowering very rapidly, — that there was only fifty days' supply on hand at that time.

Q. With the present manner in which the water is used in Boston, and assuming that you are to have no additional basin built, would you, as a member of the Water Board, be in favor of making an absolute contract to furnish Cambridge with water unconditionally?

A. No, sir; I would not.

Q. Upon the conditions I have named, you would not deem it safe to make that contract?

A. I should object to making such a contract.

Q. Then, in order to become convinced that it is safe for Boston to make such a contract with Cambridge, you must either reduce your consumption or increase your supply?

A. Yes, sir.

Q. Now you are building Basin No. 4, are you not?

A. Yes, sir.

Q. When will that be finished so that the water can be taken out of it for use, in your judgment?

A. I suppose it will be finished in another season, but whether or not the water can be taken from it I cannot say.

Q. As a member of the Water Board you would not deem it safe to make the contract?

A. In the spring of the year I suppose we could furnish Cambridge; but as to the unconditional supply I would not deem it safe.

Q. I believe it is understood that Cambridge has no representation on the Water Board of Boston?

A. I know of none.

Q. Nor in any department of the city government of Boston?

A. I cannot tell you.

Q. So that it has no power over the water consumption in Boston, that you know of?

A. Not that I know of.

Q. Boston supplies Somerville, Everett, and Chelsea; what other towns?

A. That is all.

Q. They are all supplied from the Mystic system, are they not?

A. Yes, sir.

Q. Under contracts made before the annexation of Charlestown to Boston?

A. Yes, sir.

Q. And while Charlestown owned the Mystic river?

A. Exactly.

Q. And while you were President of the Board?

A. No, sir; while Mr. Lawrence was President of the Board.

Q. How long ago is that? 1867 or '68?

A. Earlier than that, I think.

Q. And I understand you that those contracts generally provide that each city or town shall put in its own water-pipes, within its own limits, and at its own expense?

A. That is so.

Q. And the water-rates charged are uniform for Charlestown, Chelsea, and Everett?

A. The same as Boston.

Q. And were collected formerly by Charlestown, and since the annexation by Boston?

A. Yes, sir.

Q. And that there is a refund to the cities, whose inhabitants are furnished, of a certain percentage of those rates?

A. Yes, sir.

Q. What is the percentage in the case of Somerville? Is it fifteen per cent.?

A. I think it averages perhaps between thirty and forty per cent.; I cannot tell exactly. It depends upon the quantity of water used.

Q. You can see those contracts, if you choose to look at them?

A. I presume so. The percentage varies from fifteen per cent. to forty per cent.; and five per cent., if they use water enough.

Q. Do you know whether Somerville takes enough water to have the rebate of thirty per cent.?

A. Yes, sir; Somerville and Chelsea use about the same quantity of water, and the rebate is about the same.

Q. That is they pay Boston for simply allowing the water to run through the pipes which they themselves have constructed?

A. The sum they pay in for pumping the water and storing it. They furnish the pipes, and we furnish the water.

Q. The expense of Boston is in getting the water into their pipes?

A. That is all.

A COMMITTEEMAN. — What proportion of the water in Boston is used for manufacturing purposes, do you know?

A. I cannot tell you.

Q. Do you think one-third?

A. I should think not so large a quantity as that; I do not know but that it may be one-third.

Mr. HAMMOND. — That water which is used for manufacturing purposes is used to fill boilers for the purpose of creating steam, is it not?

A. Yes, sir; it is used for manufacturing purposes generally.

Q. Is all the water used for manufacturing purposes metered?

A. Yes, sir; I think it is. I may say this: that I think the metered water amounts to a little more than one-fourth of the amount received of the whole income.

Mr. BAILEY. — A construction has been put upon the act to authorize the city of Charlestown to supply itself with pure water; that the city has to provide a sinking-fund for the cost of construction.

A. Yes, sir.

Q. What is the cost of the construction?

A. I think it is \$1,678,000.

Q. What is the sinking-fund to-day — your knowledge?

A. I think the sinking-fund to-day is — I thought I had it here. There is a statement published the other day that gives it to you exactly. I can tell you what the cost of the Mystic works to the city of Boston is to-day, and that is about \$658,000. The Mystic has furnished nearly \$1,000,000 towards its construction.

Q. Is there not a condition in those contracts that it shall be repaid?

A. That is the reason for making those contracts in that way.

Mr. HAMMOND. — I should like to make inquiry about the Sudbury-river expense. What has been the cost of the Sudbury river?

A. About \$5,000,000, I think, so far.

Q. Have they a sinking-fund?

A. Yes, sir; but what it is I cannot state exactly. I think, however, it is \$2,000,000.

A COMMITTEEMAN. — Do you collect the rents of these cities where you supply them with water?

A. The city of Boston does the collecting.

Q. So that that is, of course, some expense in addition to the actual supply of water?

A. Yes, sir ; it is a very considerable expense. There are seventy thousand water-takers.

Q. You are under the necessity of collecting all this money, and then you pay to these towns that take the water the percentage that goes to them?

A. Yes, sir.

Mr. POOR. — You have been unable to state the amount of the water used for manufacturing purposes?

A. I do not remember exactly the quantity of water.

Q. Is it not a fact that there is a very large quantity used for running elevators?

A. Yes, sir.

Q. Is that metered?

A. Not all of it ; some of it is metered. I think this aggregates one hundred and eighty-three million cubic feet. Multiply that by seven and one-half times, and then it will give you the number of gallons.

Q. What proportion does that bear to the whole amount used for all purposes?

A. One hundred and eighty-three million three hundred and forty-four thousand eight hundred and two cubic feet multiplied by seven and one-half ; that is, for Cochituate and Sudbury. The Mystic is to be added, and the Mystic is thirty-six million two hundred and ninety-two thousand four hundred and fifty-nine, and that multiplied by seven and one-half.

Q. And are you unable to give me the full amount used for all purposes?

A. I do not see that I can.

Mr. BAILEY. — There is nothing to show that?

Mr. RUSSELL. — Whether you have any means of determining the cost to the city of Boston of a million gallons of water delivered at Chestnut-Hill reservoir?

A. I do not recollect ; I cannot tell you.

Mr. RUSSELL. — I will ask to put in, by leave of the committee, the documents from which extracts have been given. That paper is the report of Mr. D. W. Cunningham, on increasing the supply of Mystic lake. It is addressed to Joseph P. Davis, City Engineer. The table shows the area and capacities of the basins in the Mystic valley. I will only state to the committee that the summing up is forty-five million eight hundred and sixty-three thousand and seven hundred and eighty-nine cubic feet, which, reduced to gallons, is three billion four hundred and twenty-six million three hundred and seventeen thousand one hundred and forty-two.

Mr. Hammond introduces the following correspondence between

the city of Cambridge and the city of Boston, in reference to Boston furnishing water to the city of Cambridge : —

CITY OF CAMBRIDGE, Nov. 1, 1882.

To the City Council of Boston : —

GENTLEMEN : — The city of Cambridge desires an additional water supply, and we, the undersigned, have been appointed by the City Council of Cambridge a committee to ascertain whether the city of Boston can and will agree to furnish the city of Cambridge with a supply sufficient to meet its future wants ; and, if so, in what way, and upon what terms. We, therefore, in behalf of the city of Cambridge, do hereby apply to you, the City Council of Boston, for an additional supply for Cambridge, and shall be glad to meet and confer with any committee you may appoint in the premises.

(Signed) JAMES A. FOX, *Mayor*,
GEORGE H. HOWARD,
J. W. HAMMOND.

CITY HALL, Jan. 17, 1883.

Hon. JAMES A. FOX : —

Dear Sir : — The Committee on Water has on its files, among the unfinished business of last year, a communication from the city of Cambridge relative to additional water supply. I am directed to say that the committee will be pleased to confer with any committee that the city of Cambridge may appoint in the premises.

Respectfully yours,

(Signed) WILLIAM H. LEE,
Clerk of Committees.

REMONSTRANTS.

GEO. H. POOR, ESQ., FOR TOWN OF ANDOVER.

Andover is here as a remonstrant; but we shall have very little to offer, as you have before you the evidence taken in former years.

This is the third consecutive year that we have been here to defend our rights in the Shawsheen river. The sentiment of our town has ever been unanimous against any taking of the waters of that stream by Boston, Cambridge, or any other municipality except our own; and I will read the remonstrances voted by the town during the past three years, which will all apply at this time.

At a special meeting, February 14, 1881, the following remonstrance was adopted: —

To the Honorable the Senate and House of Representatives of the Commonwealth in General Court assembled: —

The inhabitants of Andover, in regular town meeting assembled, on this 14th day of February, 1881, do earnestly remonstrate against the granting of the petition of the Mayor of Cambridge to take the waters of the Shawsheen for the use of Cambridge, which petition is now pending before your honorable body.

Voted, That Wm. G. Means, Peter D. Smith, and Geo. Foster, be a committee of the town to appear before the proper legislative committee, to oppose such legislation.

In February, 1882, the following vote was adopted: Understanding that the cities of Boston and Cambridge have petitioned to take the waters of the Shawsheen river, *Voted*, That a committee of three be chosen to oppose, by all legitimate means, the granting of these petitions; and that this committee be authorized to employ counsel to aid them in such efforts.

Voted, To adopt the following remonstrance at the same meeting: —

Whereas, We are informed that the authorities of the cities of Boston and Cambridge have petitioned your honorable body for leave to take the waters of Shawsheen river, thus diverting this stream from its natural channel, which passes through the centre of Andover, we, the inhabitants of Andover, in town meeting assembled, do hereby respectfully, but most earnestly, remonstrate against the granting of the request of the petitioners, believing, as we do, that the loss of the river would result in irreparable injury to the material interests of the town, seriously affect its educational institutions, and greatly endanger the health and lives of its citizens.

And again, December 4, 1882, in anticipation of this hearing: —

In view of the renewed attempt of Boston and Cambridge to gain possession of the Shawsheen river, *Voted*, That the committee chosen at the town meeting, held on the 13th of February last, for the purpose of resisting such attempts by all

legitimate means, be renewedly instructed and urged to use their best endeavors to frustrate the new effort to be made before the incoming Legislature to despoil the town of its immemorial rights in the Shawsheen river."

Those are the votes of the town in remonstrance. Our objections to granting the river to Boston and Cambridge may be put upon three grounds. We have shown you in our petition what our needs are; and on that subject I will simply say that we want the water just as the God of Nature sends it to us in its purity and its entirety, not the polluted waters from the bog-meadows proposed to be given to us by Cambridge. If Andover gets this, it will be what the public health most demands. Next is the damage to our manufacturing interests. We have in Andover four factories, all on the Shawsheen river. The first one, at Ballardvale, employs about two hundred operatives, and supports a population of six or seven hundred people, has a taxable value of \$117,000, and for years has been the life and support of that little community with its churches, schools, lecture-hall, etc. That is the flannel-mill of Capt. Bradley. Two mills lower down the stream are the flax-mills of the Smith & Dove Manufacturing Company, who employ two hundred and fifty operatives, supporting a population of four or five hundred people, having a taxable value of \$164,000. Half a mile below that are the Marland mills, Moses T. Stevens, proprietor, where there is a population of four or five hundred, supported by about one hundred and fifty operatives in those mills. The taxable value of that property is \$105,000. Below that, about half a mile, is Frye village, where there are more flax-mills of the Smith & Dove Manufacturing Company, with a taxable value of \$30,000. As I have said, these mills are substantially the business interests of Andover. Upon them, we may say, everything in Andover, in the way of business and trade, depends. You will see there is a valuation of about \$400,000, operatives to the number of six to seven hundred, supporting a population of over two thousand people, nearly half our entire population. Nearly all our churches, libraries, and schools were endowed with money made in these mills.

The third reason is sanitary. The Shawsheen flows through the thickly populated portion of our town. The river receives the natural drainage of the town, and carries it away from our midst, acting as the natural scavenger of our community.

I will call the attention of the committee to Dr. Howarth's testimony on page 117, and that of Dr. Pennington on page 119 of the report of 1882, showing what dangers to the public health may be expected if the Shawsheen, or any considerable portion of it, is diverted.

There are three hundred or four hundred students always in attend-

ance at our famous schools in Andover, and we believe the stream is of benefit to them.

I do not propose, Mr. Chairman, to introduce any testimony from Andover in remonstrance. We have gone over the ground in the two former years very fully. You have said you desire to hear nothing except what is new. I will, therefore, leave in your hands the printed testimony, in the hope that you will give it your careful attention.

One word for Mr. Stevens; I need hardly state his objections to the loss of the stream. They are the same as the other manufacturers. They will have their objections stated by the eminent counsel here representing them, and I will give way to them.

J. R. BULLARD, ESQ., FOR J. PUTNAM BRADLEE, ESQ., PROPRIETOR OF
BALLARDVALE MILLS.

If the Andover case is finished, in behalf of the mills at Ballardvale, I desire to add only a few words to what my brother Poor has already suggested. A year ago the members of this committee made a personal examination of the ground, and I think it aided the committee in reaching its conclusions more, perhaps, than anything that occurred in the way of evidence. They examined the river from the point where it is proposed to build the dam. The committee went of its own motion, and was not accompanied by counsel. I only desire to say that, if it was important last year that the committee should take that course, when it was proposed by Cambridge to leave in the river a daily flow of twelve million gallons, it is more important that this committee should go over the ground when it is proposed to take all, and leave nothing; and, should you see it, you will conclude that if this river were stopped, not only ruin to Ballardvale would come, but pestilence and death would lie along the banks of the present stream; and you will decide that the petition of Cambridge should not be granted. Boston makes no case. Her wants, if she has any, are in the remote future. It was shown clearly by evidence, yesterday, that she has a supply of sixty gallons a day for eight hundred thousand inhabitants, and that would be ample for the next forty years; and, further, she has constructed a conduit through which she proposes to take fifty million gallons or more from the Charles river, thus making her supply sufficient to meet the wants of a population much larger than it is believed she will ever have.

In 1879, to come to the matter of Cambridge, a committee which was appointed, consisting of the present Water Board and the City Solicitor and Engineer Barbour, came to the unanimous conclusion that Cambridge should seek a supply from Boston; that Boston had an ample supply, and Cambridge should look there. This was recom-

mended also by one of the most eminent of engineers, Mr. Cheshbrough ; but, for some reason, Cambridge changed its mind, and came to the Legislature in 1881 with a petition to be permitted to take the Shawsheen river. The committee reported a bill, but the Legislature decided that Cambridge should go to Boston for a supply ; but in 1882 Cambridge, having taken no step in that direction, came again to the Legislature for the Shawsheen, and the committee for that year also concluded that it would be wise for the city of Cambridge to come to the city of Boston, and so reported, and was sustained in both branches. In the fall of last year Cambridge wrote a polite note to the city of Boston, and received a polite and prompt reply appointing a time for a conference. That appointment fell on the municipal election day in Cambridge, and the meeting being postponed, the matter was allowed to drop ; until this year, Boston addressed a note to Cambridge saying that among the unfinished business of 1882 the application of Cambridge had been found, and Boston was ready to attend to the subject, and to this no reply has been made.

It seems to us, gentlemen, that we might safely leave Cambridge here, relying that your report would be like that of last year's committee, if it were only for the purpose of impressing upon parties the danger of ignoring the conclusions of legislative bodies, which are reached at such a great expense to the State. But we have not done this ; we have gone further. Capt. Bradlee, with his old-time energy, has employed Mr. Crafts, Mr. Doane, and Mr. Forbes, all engineers of the highest standing, at his own expense, to investigate the subject of a supply for Cambridge ; and those gentlemen, after a thorough and impartial investigation of the whole subject, have discovered a source of supply, which, in all points, is equal to that asked for by Cambridge, and, in some respects, much superior. Mr. Barbour was invited to join these gentlemen ; and, if he had been able to attend, I have no doubt he would have united heartily with them in their conclusions, and opposed any scheme for taking the waters of the Shawsheen.

This report, gentlemen, which I now put in your hands, shows a basin which is vastly superior to the Shawsheen basin ; a water which, by the analysis by Professor Wood, is fully equal to the Shawsheen ; and an ample supply which could be brought to the works at Cambridge at four-tenths the cost of bringing the waters of the Shawsheen there. The source to which I refer is what is known as Stony-brook basin. You will find in this report an accurate map of the entire territory taken from the standard map of Boston and vicinity, and reproduced by the heliotype process.

This report would have been distributed much earlier, Mr. Chairman and gentlemen, except that the map was only completed yester-

day. Captain Bradlee is here, and I will only ask the committee's attention to his testimony as to the peculiar character of his mills.

Mr. R. M. MORSE, Jr. — Before the testimony is offered by Mr. Bullard, I desire to state that I represent the Smith & Dove Manufacturing Company, who also remonstrate against the application of the cities of Boston and Cambridge; but as I desire to address the committee but once, I shall reserve what I have to say until after the evidence is in.

Mr. W. G. RUSSELL. — We propose to introduce the engineers who made this investigation, and submit them to examination by the other side.

Mr. J. PUTNAM BRADLEE.

Mr. BULLARD. — You are the proprietor of the Ballardvale mills?

A. Yes, sir.

Q. Will you state, generally, the condition of the population there, and what has been done for their advancement?

A. I do not know that I have anything more to say, further than what I have said at previous hearings. I employ two hundred and fifty people, and produce from \$400 to \$500 worth of flannel a day. We have seventeen sets running in that mill, and we have to have an extra cylinder and a grading-mill.

The CHAIRMAN. — What power is your mill?

A. One hundred horse-power. One point in relation to this matter is, that if you take this water away my mill is ruined. I can run my mill by steam; I can make my goods by steam; but I *cannot* finish them. I require this water, owing to its peculiar characteristics, to finish my goods; and if they take the water from there, that supply is gone.

Q. What proportion of the flannel, of the quality you produce, manufactured in this country, do you make?

A. Three-fifths.

(Sample of products of the mill exhibited to committee.)

Q. Can you get as good a water for your purposes from other sources?

A. I do not know where to get it; I don't know where to go for it.

Mr. BULLARD. — Have the flannels any trade-mark?

A. They are known all over the country as "Ballardvale flannels."

Q. Is the village of Ballardvale entirely dependent upon that mill?

A. It is.

Q. How fine is the finest yarn you make?

A. I made some for the exhibition forty-four thousand yards to the pound; and calling it seventeen hundred and eighty yards to the mile, one pound of it would reach to Lawrence. That was an ex-

hibition skein, to show what the mill could do. The ordinary weight of that yarn you have in your hand is (40,000) forty thousand yards to the pound. I should be very sorry to be obliged to give up that water supply. I have been there, and had control of the mill since 1852. The mill is well organized, and the people seem to be well contented. There is no trouble in running the mill.

Q. Independent of power, you are entirely dependent upon an ample supply of pure water?

A. Yes, sir. Cannot finish those goods without it, and we require a good head for scouring.

MR. HAMMOND. — How long have these mills been using this water for the manufacture of this class of goods?

A. In 1836, I think, the mill was established.

Q. Your water-power is about one hundred horse-power?

A. Yes, sir; about one hundred horse-power.

Q. Your machinery is run partly by steam and partly by water?

A. Yes, sir.

Q. Have you ever estimated the power you derived from the river?

A. That depends upon the season.

Q. Whatever it is; probably less than one hundred, probably fifty horse-power?

A. Not fifty horse-power.

Q. Take the privilege as it comes; it is fifty, is it not?

A. An engineer more capable than I must answer that question.

Q. How much steam-power have you?

A. Two engines; one one hundred, and one thirty horse power.

Q. As to the water that you need for your flannel, you were here last year and opposed the petition which Cambridge presented?

A. Yes, sir.

Q. So far as that petition was concerned you did not see that it would affect your supply for scouring purposes?

A. I testified that I did not know what the effect would be of letting twelve millions go down over there. I preferred to let well enough alone.

Q. Of course that water-power can be used for other purposes than for making flannel?

A. I do not know about others. You could go to work and make chairs there, or anything else; but when you come to make fine white flannels it is impossible to do without it.

Q. Are there any other works of the same kind in this State?

A. I am not aware of any.

Q. Is there not one on the Sudbury?

A. No, sir; none other than this one at Ballardvale.

Q. If Boston and Cambridge should be authorized to take the water, you would have a claim for damages in your opinion?

A. Most decidedly.

Q. And one of your claims would be that you could not find any other place to manufacture your goods in, would it not?

A. It depends entirely upon whether you took the supply away from me. The question of damages would come up afterwards.

Q. You would expect to have them paid, would you not?

A. I certainly should.

MR. BAILEY. — You said you required a head of water to scour your flannels?

A. Yes, sir.

Q. How much?

A. It would be no use for me to take that water from the bed of the river. So far as Boston is concerned, your water here I would not put it on to our flannels.

Q. How high do you want it?

A. As soon as it gets to a certain point, I stop one cylinder.

Q. You husband your water all you can?

A. Nurse it all we can.

Q. What is the height of your dam?

A. Ten or eleven feet.

Q. That is all the head you require?

A. Yes, sir; and we want that up on the river, so that we cannot get down on to this mud.

Q. Ten or twelve feet is all the head you require, is it?

A. That is all we have got.

Q. How far are you below where we propose to make this dam?

A. Four miles.

Q. There are times when the river is low.

A. Yes, sir.

Q. What do you do then?

A. It never has been so low but what I could manage it. That is very rare. We have run along a good many years.

Q. Year in, year out, it is not more than a day or week that you go without scouring?

A. No, sir; we have to nurse it. If we find the water clear, we use it; if not, we don't.

Q. In the spring of the year, a large percentage of the water goes by not used by you or anybody else?

A. Yes, sir; as in all rivers.

Q. Have you not thought that it would be a good thing for the mill-owners on that stream to make a reservoir above there?

A. I should be very glad to join them.

Q. Because it would be best for your business?

A. Yes, sir.

Q. What is the capacity of your mill-pond?

A. I do not know. You can get all that from Mr. Crafts. I employed him to show Cambridge where they could get a supply of water without going to the Shawsheen.

MR. N. HENRY CRAFTS.

MR. BULLARD. — What is your occupation?

A. Civil engineer.

Q. How long have you been in that profession?

A. Since 1849 or 1850.

Q. Formerly City Engineer of Boston?

A. Yes, sir.

Q. Are you the Mr. Crafts referred to yesterday by Mr. Hammond as having made certain estimates as to the future population of Cambridge?

A. Yes, sir.

Q. Were you employed, during last year, to make an examination of a water supply for Cambridge?

A. Yes, sir; in connection with Mr. Doane and Mr. Forbes.

Q. Will you state, Mr. Crafts, whether you paid some attention first to the Concord river, as a source of supply?

A. Not in the way of a personal examination. By the use of a map I determined the distance, and the nearest route by which the water could be supplied to Cambridge; and I ascertained from the contour of the ground that the water would have to be elevated over a water-shed, and for that reason the Concord river was left out. I found Stony brook much more promising. Clematis brook was left out, also Beaver brook.

Q. Where is Clematis brook?

A. It is situated in Belmont, Waltham, and Lexington.

Q. In the matter of a water supply, what elements do you consider?

A. The elements of quantity, quality, and economy.

Q. If you will, take up Stony-brook basin under those different heads, and tell us what you have found; where it is, first.

A. Stony brook is a tributary of Charles river, and empties into it about two miles above the Boston Manufacturing Company's works. It has a drainage area of about twenty square miles. Sandy pond, at the head of the basin, is used as a supply for Concord. The direction of Stony brook is nearly north, and we found in our examination a sufficient area to supply the quantity of water which Cambridge would require. We tried different samples as to its quality, and we had

calculations made as to its capacity of storage, and those elements were taken into account. A portion of Lexington is in Stony-brook basin; a larger portion is in the Shawsheen basin. The character of our investigation was to inquire in regard to the present population and that of previous times, in order to get at the rate of growth of the district. You will find by the report that there is very little difference between the two basins in that respect. It will be found by reading the report that there is an ample water-shed, ample storage, — as much as Cambridge will ever need, — and our conclusion was that, as a source of supply for Cambridge, it was the best to be taken.

Q. Did Professor Wood obtain his own samples?

A. Yes, sir. I was present at the time. He took the water from three or four different places on the stream.

Q. How many mills are there that would be affected by taking the water from this pond, as compared with the Shawsheen?

A. The mills below the dam?

Q. Yes, sir.

A. I think there are about the same number. The Boston Manufacturing Co., and one or two others below that; on the lower privilege in Watertown there are several small mills.

Q. What is the fall at this point?

A. The fall at this point is forty feet.

Q. What sort of a basin is it proposed to construct there?

A. I have said we proposed to construct a dam where the brook runs through what is called Roberts pond, in a deep ravine.

Q. How long would that dam be?

A. About six or seven hundred feet. Those points are all stated in the report, I think, fully. There is a small pond there, which I think will average six to eight feet deep. The dam which we proposed to build will raise the water above the level of that, twenty feet in addition, and we get a storage capacity of three hundred million gallons.

Mr. W. G. RUSSELL. — How steep are the banks in that river?

A. On the east side they are very steep, — so steep that, in getting that additional storage, with only fourteen additional acres of ground, we gain twenty feet of depth.

Q. What is your whole area of flowage, including the old pond?

A. Thirty-eight acres of old pond and twelve of new.

Q. So that, as compared with the Shawsheen, it would be fifty acres as against eight hundred?

A. Yes, sir.

Q. How would that basin compare with the other, Mr. Crafts, if free from objection on account of objectionable matter?

A. Compared with the Shawsheen?

Q. Yes, sir.

A. Very favorably.

Q. What portion of it would be subject to *algæ*?

A. About five acres. There is very little shallow flowage as compared with the Shawsheen basin.

Q. How is it compared with any other basin which is used for storage about Boston?

A. I think it is superior in that respect to any of the artificial basins that I know of. There is a much larger proportion of shallow flowage in our Cochituate basin, which is considered one of our best basins.

Mr. BULLARD. — How much could this basin be relied upon to furnish to Cambridge; taking the whole area of the basin, how large a supply could it be relied upon to furnish to Cambridge?

A. Seven to eight million gallons each day. I have prepared a table there, in the report, showing what would be the ordinary storage of the basins during a series of nine years.

Q. Is there the least danger, with this supply in connection with Fresh pond, that Cambridge would ever be short of water?

A. No, sir.

Q. And I understand you to say in your report that the total expenses would be four-tenths of the probable cost of the Shawsheen scheme, — that is, excluding mill-damages in each case, the expense would be four-tenths of the expense of the plan proposed by Mr. Barbour?

A. Yes, sir.

Mr. RUSSELL. — In regard to the expense of the Shawsheen, you have been over Mr. Barbour's estimates in this year as well as any other?

A. Yes, sir.

Q. You know it is \$700,000?

A. That is the same as last year.

Q. Is there any element of cost which has changed since last year, which would cause you to revise your figures?

A. I think that we should both have to estimate on a more thorough cleansing of the basins.

Q. A more entire removal of soil and vegetable matter?

A. Yes, sir.

Q. Take your own figures, which you made some months ago, on Stony-brook basin, you have made an estimate for cleaning ten or twelve acres?

A. Removing earth, about \$3,000.

Q. You have estimated \$300 an acre for clearing the bottom; what would be your present estimate of removing the muddy bottom?

A. There is none in Stony brook.

Q. Supposing you were going to estimate on it, should you say that \$300 an acre was correct?

A. No, sir; I should not. I should say that double that estimate would not be too much.

Q. In revising your estimate of \$3,000, is there anything which would cause you to change it?

A. I think I would rather let it stand. The nature of the soil is such that I doubt if it would require to be moved.

Q. Then you would say that Mr. Barbour would have to add perhaps \$300,000 to his estimate of cost?

A. About.

Q. How is it about the general cost of that Shawsheen plan otherwise? Is it properly estimated, as to cost, in your judgment?

A. I think everything there is nearly correct, except the length of pipe. He calls it thirteen and one-half miles, and I call it fifteen miles. Our estimates, though, as to size of pipe, were exactly the same.

Q. You have estimated on the same kind of pipe, and at the same cost, as you and Mr. Barbour did for the Shawsheen?

A. Yes, sir, precisely.

Q. What is the difference between Stony brook and the distance to the Shawsheen?

A. I should think about seven miles.

Q. As an engineer, advising Cambridge as to its water supply, would you have any hesitation as between those two sources which you would tell them to take?

A. No, sir. There is a slight superiority on the Shawsheen basin, owing to the density of population, and the probable increase of population.

Q. Is there anything in your view which would affect the purity of the water which would go through this valley?

A. No, sir. Dr. Wood's testimony on that point is conclusive.

A COMMITTEEMAN. — I would call your attention to the closing paragraph in your report. In this closing paragraph you speak of your final opinion with regard to this whole matter, that "if Boston will furnish the requisite amount to supply any deficiency that may occur in the requirements of Cambridge for the next ten years (as she is abundantly able to do), and at a fair and equitable rate, to be fixed by arbitration, if necessary, it would be the best solution of the problem as it exists to-day, inasmuch as it would give ample time for a complete study of the important unsolved problems above referred to, by competent experts, and for such legislative action as may be requisite to establish a comprehensive and suitable system of water supply and drainage for the entire metropolis." I suppose you would include this metropolitan district drainage system?

A. Yes, sir.

Q. You have been very familiar with this whole system, and this is your ultimate conclusion on that subject, is it?

A. That is my best judgment.

Q. And that it really would not be wise, under existing circumstances, for Cambridge to go to the Shawsheen, or any other source, but to take her supply from Boston in the meantime, and then be looking out on a proper scale?

A. Yes, sir.

Mr. W. G. RUSSELL. — What is the comparative cost of the two schemes? What is your estimate of the cost of Stony brook, yielding seven millions of gallons a day?

A. \$385,000.

Q. That is for everything but the mill damages?

A. Yes, sir.

Q. Now, as to the cost of water to the city of Boston, have you any means of estimating the cost of the water delivered at Chestnut-Hill reservoir?

A. Yes, sir. The cost per million gallons, delivered at Chestnut-Hill reservoir, is \$45.35.

Q. What does that include?

A. Interest on the cost of the works requisite to deliver the water there, including the reservoir itself, but no pipes. The entire expense of the Sudbury and Cochituate system would be \$45.35.

A COMMITTEEMAN. — Any difficulty in a body of experts in ascertaining what would be a fair and equitable rate on the part of Boston for supplying Cambridge with water?

A. It could be got at readily.

Mr. RUSSELL. — Is this report a fair and impartial statement, on your part, of the facts it purports to contain?

A. Yes, sir; I have given my best judgment.

Q. Is there anything which you wish to qualify before this committee?

A. No, sir; not that I know of.

Mr. HAMMOND. — As I understand it, you contemplate taking the storage-basin on the south-east corner of the water-shed?

A. Yes, sir.

Q. Of what extent is that basin?

A. Three hundred million gallons.

Q. That is now the mill-pond of some mill?

A. Yes, sir.

Q. That gives a storage capacity of three hundred millions?

A. Yes, sir.

Q. Do you contemplate building any other basins?

A. I have not thought of it.

Q. Is it a part of the plan?

A. I have estimated that the ultimate result will be from six to seven millions a day.

Q. By the building of that basin, as you propose, if Cambridge could get five or six million gallons a day there, that would be sufficient in the dry season?

A. Yes, sir.

Q. Without the construction of any other basin?

A. Yes, sir.

Q. Are there any churches, or theological seminaries, or anything of that kind, on the water-shed of that stream?

A. No, sir.

Q. You have no apprehension that, if Cambridge made application for that source, she would be met by such opposition?

A. I think not.

Q. Are you aware whether any students bathe in that stream?

A. No, sir.

Q. How many mills are there there that would be affected by the plan which you propose or suggest?

A. I have not studied that.

Q. There is a shoddy mill located on that stream, is there not?

A. There is.

Q. Do you know whether that mill allows to pass into the stream, by reason of its existence there, any substance which would have a deleterious influence upon the stream?

A. I think not.

Q. What do they do there?

A. I don't know anything about it.

Q. How far is that above the point where you recommend that the reservoir be constructed?

A. A mile and a half, and perhaps two miles.

Q. Of course your plan contemplates the abolition of such mills above the reservoir, as experience shows it would be desirable?

A. Yes, sir; certainly.

Q. What is the water-power on the stream above the dam, — a valuable water-power?

A. I cannot state it without making a calculation. I would say here, in this connection, as to the mill at the head of the pond referred to, a portion of our estimate contemplates the taking of that building.

Q. You estimated what would be the worth of the property?

A. No, sir, — did not estimate at all.

Q. What did you do?

A. Examined into the real-estate valuations by the assessors.

Q. How about Stony brook; is it not substantially parallel with the main road between the two villages?

A. Yes, sir.

Q. I understood you to state that, as to the probability of future contamination, the Shawsheen supply is better than this.

A. I don't know that I so stated it.

Q. What do you think about it? I understood you to say that on the question of the possibility of future contamination the Shawsheen was better than Stony brook?

A. I think it is better, although it is impossible to foretell.

Q. Try to foretell. What do you think about it?

A. I tried to foretell by a comparison of the population in those districts. I tried to show the present growth. The rate of growth has been no greater on the Stony brook than on the Shawsheen.

Q. Judging the future by the past, you thought the chances for purity in the future a little better on the Shawsheen?

A. Perhaps so.

Q. You don't think there is any difference?

A. I acknowledge there is a slight difference.

Q. You are also aware, I suppose, that the Massachusetts Central Railroad proposes to go through the town of Weston?

A. Yes, sir.

Q. And right through the centre of this water shed?

A. Across it. I don't see why that should affect the water any more than the Fitchburg, which has been there for nearly forty years.

Q. There is quite a settlement along the line of the Fitchburg in the vicinity of the town of Weston?

A. Yes, sir.

Q. Whether or not the passing of another railroad through that section would not have a tendency to affect the purity of that water?

A. No, sir.

Q. Do you know the total water-power on the Charles river?

A. That varies very much during the hot season of the year.

Q. And these mills below the point where you speak of would have a claim for damages for taking the waters from the brook?

A. Yes, sir.

Q. That has not been estimated?

A. It has. I based that on the amount of water to be taken into Cambridge, and the fall. Reckoned the cost of a horse-power upon the basis of the awards made in the case of the water taken by the town of Waltham.

Q. By jury or arbitration?

A. I don't know which.

Q. What were they awarded?

A. They were awarded about \$50 or \$60 a year per horse-power. I am not certain whether I have it or not. The calculation was based upon the award made to the town of Waltham.

Q. In 1874 you were asked by the town of Watertown to consider where they could get a water supply?

A. Yes, sir.

Q. Did you then examine this source of supply?

A. I did not.

Q. Why not?

A. In the first place, Waltham had already taken a supply from Charles river about that point. One proposition was to take the supply from the town of Waltham. There were other sources near it, but none which promised better resources.

Q. You found other sources enough for Watertown, without going any farther?

A. Yes, sir.

Q. Didn't you go farther off than this place?

A. No, sir.

Adjourned to March 2, 1883.

Resumed, March 2, 1883.

Mr. CRAFTS. — *Continued.*

Mr. W. G. RUSSELL. — Some statements have been made as to the present value of the Sudbury river; its yield at the present time. Will you state what is the yield that can be depended upon, at all times, in the Sudbury river and the Cochituate?

A. For an exceedingly dry year, the dryest year we have on record for a period of thirty years, the capacity of Lake Cochituate is put at twelve millions of gallons a day, and the Sudbury river at thirty million gallons a day.

Q. Do you know of any reason or possibility which will not estimate the Sudbury at thirty millions of gallons for a year?

A. I never knew exactly how that estimate was made; but I know the ultimate capacity of Sudbury river was based upon seven or eight basins, and that was to supply forty million gallons a day. That estimate was made by Mr. Joseph P. Davis, and was based upon an area of water-shed of seventy square miles. More complete surveys which have been made show that the water-shed is seventy-six to seventy-eight square miles, and that would add to the capacity of the stream three to four millions a day.

Q. If the Sudbury system to-day is only yielding twenty million gallons a day what is it owing to?

A. It is yielding more than that; but that is probably the supply of Boston. No doubt Sudbury is yielding to-day thirty million gallons a day, with its present storage.

Q. Now take Basin No. 4, and Whitehall basin alone, how much will they increase it? Was Mr. Sawyer right in saying five millions each?

A. My estimate of the capacity of Basin 4 will make up thirty-eight millions.

Q. With Whitehall basin added?

A. Forty-five millions. That exceeds by five millions of gallons the estimate of Mr. Davis. The larger part of that is made up by the increase in the water-shed.

Q. What is the actual yield of the Mystic at present?

A. In a dry year I should place it at eight millions of gallons per day.

Q. How much with the full capacity of storage developed, leaving out lower Mystic pond?

A. Fifteen millions. It was estimated by Mr. Kirkwood and Mr. Francis at seventeen millions in the dryest year.

Q. Taking their estimate, you say fifteen millions, instead of seventeen millions?

A. Yes, sir.

Q. Have you made some tables, Mr. Crafts, showing the capacities of the various sources used to supply Boston, Chelsea, Somerville, Cambridge, and Everett?

A. I have.

Q. Those tables show the present capacity and the capacities as developed?

A. As developed.

Q. Have you also made a statement relative to the growth of population in the towns of Boston, Chelsea, Somerville, Cambridge, and Everett?

A. I have.

Q. And of the cost of the water to those different towns now supplied from Lake Cochituate, Sudbury, the Mystic river, and Fresh pond?

A. I have.

Mr. W. G. RUSSELL. — I ask the attention of the committee to the tables above referred to. They are as follows: —

Combined capacities of the various sources now used to supply the

cities of Boston, Chelsea, Somerville, and Cambridge, and the town of Everett : —

(1.) *Present Capacities.*

	Gallons per day.
Lake Cochituate, in the dryest year	12,000,000
Sudbury river “ “	30,000,000
Mystic pond and basin, in the dryest year	8,000,000
Fresh pond “ “	2,000,000
Total capacities as now arranged	52,000,000

(2.) *Capacities when new Sudbury basin is built.*

	Gallons per day.
Lake Cochituate, in the dryest year	12,000,000
Sudbury river “ “	38,000,000
Mystic “ “	8,000,000
Fresh pond “ “	2,000,000
Total capacities with new Sudbury basin	60,000,000

(3.) *Capacities when fully developed.*

	Gallons per day.
Lake Cochituate, in the dryest year	12,000,000
Sudbury river “ “	45,000,000
Mystic “ “	15,000,000
Fresh pond “ “	2,000,000
	74,000,000

Statements relative to the growth of population in the above-named municipalities : —

(1.) Taking the entire districts now supplied from the Cochituate and Sudbury, Mystic and Fresh pond sources, the rate per cent. of increase for each five years, and the average annual increments from 1850 to 1880, are as follows : —

1850-1855, increase per cent., 20.45 ; annual increment,	8,600
1855-1860, “ “ “ 16.53 ; “ “	8,370
1860-1865, “ “ “ 9.03 ; “ “	5,325
1865-1870, “ “ “ 13.52 ; “ “	6,232
1870-1875, “ “ “ 18.42 ; “ “	13,448
1875-1880, “ “ “ 6.87 ; “ “	5,945

(2.) Statement of the population of the five municipalities referred to above, from 1880 to 1910, allowing an increase of 25 per cent. for each decade:—

1880.	By United States Census	.	.	.	466,205
1883.	Estimated	.	.	.	500,000
1890.	"	.	.	.	582,756
1895.	"	.	.	.	655,600
1900.	"	.	.	.	728,445
1905.	"	.	.	.	819,500
1910.	"	.	.	.	910,556

Population that may be supplied under various conditions:—

(1.)	52,000,000 gallons per day, at 60 gallons <i>per capita</i> , will supply	866,667
	52,000,000 gallons per day, at 50 gallons <i>per capita</i> , will supply	1,040,000
(2.)	60,000,000 gallons per day, at 60 gallons <i>per capita</i> , will supply	1,000,000
	60,000,000 gallons per day, at 50 gallons <i>per capita</i> , will supply	1,200,000
(3.)	74,000,000 gallons per day, at 60 gallons <i>per capita</i> , will supply	1,233,333
	74,000,000 gallons per day, at 50 gallons <i>per capita</i> , will supply	1,480,000

Cost of water in the municipalities now supplied from Lake Cochituate, Sudbury river, Mystic pond, and Fresh pond (approximate):—

Lake Cochituate and Sudbury River.

Cost per million gallons in C. H. Res'r, at 31,000,000 per day	\$45 35
Cost per million gallons distributed, at 31,000,000 per day	95 78
Cost per year per head, distributed (pop. 344,450)	3 15

Mystic System.

Cost per million gallons distributed, at 7,200,000 per day	\$82 34
Cost per year per head, distributed (pop. 88,000)	2 46

Fresh Pond.

1880.

Cost per million gallons distributed, at 2,423,220 per day	\$128 84
" " year per head, " (pop. 52,740)	2 16

1883.

Cost per million gallons distributed, with Shawsheen added .	\$183	07
“ “ year per head, “ “ “ “ .	3	01
“ “ million gallons “ “ Stony brook added,	153	46
“ “ year per head, “ “ “ “ .	2	42
“ “ million gallons “ “ one million per day, from Boston, at \$50 per million	131	60
“ “ year per head, distributed, with one million per day from Boston, at \$50 per million	2	33

Assuming that Fresh pond will yield 1,750,000 gallons per day, the total deficiency to be supplied from other sources in the next ten years will be 3,899,493,925 gallons.

Interest on \$1,000,000 + \$4,000 expenses :

The cost from the Shawsheen will be \$540,000 00

Interest on \$450,000 + \$4,000 expenses :

The cost from the Stony brook will be 265,000 00

“ “ Boston, at \$50 per million, will be . . 195,000 00

A COMMITTEEMAN. — What do I understand by fifty dollars per million?

Mr. RUSSELL. — Fifty dollars per million to be paid to the city, as the price for the purchase of its water.

Q. Do you know how much that would cost per year?

Mr. W. G. RUSSELL. — Yes, sir; three hundred and sixty-five times fifty dollars per million. I suppose Mr. Crafts knew that when he made his estimate.

A COMMITTEEMAN. — Mr. Crafts, how do you get at this cost of water? You make out that the present cost of water to Cambridge is \$128 a million; how do you make up that cost?

Mr. CRAFTS. — Perhaps Mr. Russell should state that that is marked as approximate. Of course it could not be figured down exactly without access to the books. I take as the basis, the cost of the construction of the works, as given in the public reports, and allow, in every case, the same rate per cent. of interest, — five per cent. Add to that the cost of maintenance of the works, not the actual cost of the extensions of the work. They are all made upon that basis. In the matter of Cambridge I estimated it upon the returns of 1880.

A COMMITTEEMAN. — You have not made any allowance for any income whatever, — it is all at one rate?

Mr. CRAFTS. — It represents the cost of the water. It is the gross cost, without any income.

Mr. RUSSELL. — With all due deference I say it is the proper way;

it is certainly as fair a way as any. You estimate it alike for those different sources of supply.

A COMMITTEEMAN. — I suppose what they receive is to pay the expense?

Mr. RUSSELL. — \$128 per million, and that is estimated on the basis that they distribute two million four hundred and twenty-three thousand gallons per day.

Mr. RUSSELL. — Now, a moment as to Stony-brook supply. What is the character of the country from which that supply is derived? How did you get at the density of the population, Mr. Crafts?

A. It was obtained by counting the number of dwellings within the water-shed in each town, and reckoning five persons to a dwelling, and the same way in the Shawsheen valley.

Q. Have you examined the map as to the distribution of that population, — whether there is any essential difference between the two districts?

A. None, to my knowledge.

Q. If you take the population on the tributaries of the Shawsheen, do you find as dense a population near the water supply as you find in Stony brook?

A. Quite as dense; in fact, I think the population is more evenly distributed on the Stony brook than in the Shawsheen valley, — more scattered.

Q. And more concentrated in the vicinity of the water?

A. In the vicinity of the stream, of course, it is more concentrated.

Q. Some question has been asked as to what invitation you gave to the city of Cambridge, or its engineer, to look into the matter of this water supply?

A. I said that I went to Cambridge with the intention of seeing Mr. Barbour, and invite him to visit the premises with us. At that time Mr. Barbour was out of the office. There was a gentleman who had been associated in this case, a Mr. Gates of Cambridge. I went to his house, he was to accompany us; he made the arrangements for our transportation. I saw him and requested him to make the appointment with Professor Wood, and told him that I should be pleased to have Mr. Barbour go with us, and to see if he could get him to go with us. The arrangements were all made by Mr. Gates with Professor Wood, and I left it with Mr. Gates to see Mr. Barbour. There was nothing formal in the invitation.

Q. You took some pains to get Mr. Barbour there, as you did Professor Wood?

A. Mr. Barbour accompanied us on that very day.

Q. And in pursuance of that appointment made with Mr. Gates?

A. Yes, sir.

Q. Did he go over the territory with you?

A. He did.

Q. How much of the day was he with you?

A. The greater part of the day. It took the whole day, including going from Boston to Stony brook and back again.

Q. Did you have any discussion with him?

A. Some, in a general way.

Q. Did he know where the samples were taken from?

A. He was present, and saw where the samples were taken from.

Q. Was there any difference between the engineers as to the part they took in the examination of that territory on that day?

A. No, sir.

Q. After that what occurred; did he go again?

A. Not to my knowledge.

Q. Did he ever come to confer with you about the supply from that time?

A. No, sir.

Mr. HAMMOND. — Mr. Crafts, you were employed by Mr. Bradlee to investigate this Stony-brook supply?

A. Yes, sir.

Q. And you had associated with you Mr. Doane and Mr. Forbes?

A. Yes, sir.

Q. You came to the conclusion to notify Mr. Barbour what you were about?

A. Yes, sir.

Q. You didn't see him, did you?

A. No, sir.

Q. But you left Mr. Gates to see him?

A. Yes, sir.

Q. And you don't know what Mr. Gates told him, do you?

A. No, sir.

Q. And at a certain time you, Dr. Wood, and Mr. Barbour met somewhere, and Mr. Gates, Mr. Doane, and Mr. Forbes weren't with you?

A. Mr. Forbes was with us, but not Mr. Doane.

Q. You met where?

A. We met on the train, — met Mr. Barbour, Mr. Gates, and Mr. Wood at Cambridge station, and went from there to Waltham.

Q. What did you do when you got there?

A. We took a carriage and drove up to the place where we proposed to take our samples of water.

Q. Where was that?

A. That was left entirely to Prof. Wood.

Q. Where did you take the water from?

A. Four different points. One at or near Sibley's dam ; the second, at Hobbs' brook ; the third, at the junction of the two brooks, or a little above that. It is all stated in the pamphlet.

Q. What else was done that day?

A. That was all that was done.

Q. You, Mr. Barbour, Mr. Gates, Dr. Wood, and Mr. Forbes went to four different points, and Dr. Wood took samples of water. Anything further done that day?

A. Nothing, except that on our way back to Waltham we came back by the way of Roberts pond, to look at that.

Q. Did you ever afterwards see Mr. Barbour in connection with this business?

A. I think not.

Q. Subsequently did you make an examination as an engineer of the water-shed, etc.?

A. I made a general examination.

Q. What did you do?

A. Went over the district. The part which I examined more particularly I examined with Mr. Doane. I went up at that time as far as half a mile above what is called the shoddy mill-dam ; examined the stream and the facilities for storage.

Q. Did you make any measurements at that time?

A. No, sir.

Q. Did you ever make any measurements?

A. I made soundings with Mr. Doane.

Q. How did you get at the extent of the water-shed?

A. That was taken from maps.

Q. What kind of maps will show the water-shed?

A. Most any maps will show the topography of the country.

Q. What maps did you have?

A. The map of Middlesex county.

Q. The ordinary map of Middlesex county made by Walling & Gray?

A. Yes, sir ; and other maps of Middlesex county were used.

Q. What other maps besides Walling & Gray's did you use?

A. The maps showing the water supply of Boston.

Q. That does not have anything about Stony brook on it, does it?

A. It showed the stream and the territory. There are none of these maps that show the line of the water-shed. That had to be traced on.

Q. And these maps show the streams that run along into various towns?

A. Yes, sir.

Q. How did you get at the water-shed from that?

A. There are other features besides that. The crests of the hills are usually shown.

Q. Upon what maps, which you examined, are they shown?

A. The Middlesex maps. That is the way it is obtained usually when it is obtained without an actual survey.

Q. Are you certain that you have got the water-shed of Sandy pond taken out here?

A. Yes, sir.

Q. By reference to your map I see that this pink area goes right straight to the borders of Sandy pond?

A. The lower border of Sandy pond.

Q. There is a stream that seems to run from Beaver pond to Sandy pond?

A. Yes, sir.

Q. Is that a stream that empties Sandy pond into Beaver pond?

A. That is as I understand it.

Q. How do you know but what Sandy pond goes into Beaver pond?

A. I have made no actual survey, therefore I cannot say. I took this map and made my estimates, and that is the usual way of doing it without making an actual survey.

Q. Now, you three engineers, in that way, made an estimate of the water-shed?

A. Yes, sir. I will say that Mr. Doane made estimates independent of myself from maps that he had in his possession. We compared and made estimates of the water-shed; the highest was twenty-four miles, and it varied from twenty-four to twenty; and twenty, I think, was the lowest of any of the maps that we used.

Q. You stated that the Sudbury river, with its present storage capacity, in the dryest time was good for thirty millions?

A. Yes, sir.

Q. Will you explain how they had a water famine last year in September, when they didn't use but twenty from the Sudbury?

A. I do not understand that they had any water famine last year.

Q. Were you here when I read the circular that the Water Board issued?

A. Yes, sir.

Q. How could a city that has thirty millions of gallons a day in the dryest time find itself short of water when it was using only twenty millions of gallons?

A. I do not think they were short. In fact, I know they were not. I don't say there was no necessity for the issuance of that circular; that is found necessary in order to check the waste of water.

Q. You don't find that Boston issues many circulars for that purpose, do you?

A. Yes, sir ; very often.

Q. Can you explain in any other way why it is that Boston, with a supply of thirty million gallons per day in the dryest time, should get short when it is using only twenty million gallons a day?

A. No, sir.

Q. You don't see that there is any cause for that circular at one time more than at another?

A. No, sir.

Q. Mr. Davis, as far as I know, never made any estimate, except for the full capacity of the basins. He put into the report forty millions, and you gave it as fifty millions.

A. I said forty-five million gallons. He estimated on seventy square miles, and an average of twelve inches of rainfall.

Q. Who wrote this report?

A. I wrote it.

Q. It was looked over by Mr. Russell and Mr. Bullard?

A. Yes, sir.

Q. And they made alterations in it?

A. They made some suggestions as to things that might be left out.

Q. And why left out?

A. They can answer that question better than I can.

Q. And when they struck out whatever they did strike out, did they strike it out because it was not true, or they thought it best to strike it out?

A. I did not print the report. Whatever was stricken out would not change the report materially.

Q. Then this pamphlet, gotten up, so far as you are concerned, in the manner you suggested, has been submitted to the counsel of Mr. Bradlee?

A. It was delivered to Mr. Bradlee personally.

Q. You had conferences with counsel, did you not?

Mr. BULLARD. — Not until after the report was submitted.

Mr. CRAFTS. — It was suggested by counsel that I had put in some things which might be omitted.

Mr. HAMMOND. — You made admissions which would be likely to hurt your side, and which were stricken out ; that is so, is it not?

A. The alterations that were made were talked over by Mr. Doane and myself.

Q. Mr. Russell saw that these admissions were stricken out, of course?

A. I don't think it is proper to state before the committee what was stricken out.

Mr. RUSSELL. — We will give you the original report, if we can get it from the printer.

Q. Whose language is the concluding paragraph of the report?

A. My own.

Q. That is yours?

A. Yes, sir.

Q. After consulting with counsel?

A. No, sir.

Q. I understood you to say that your estimate of the cost of the water distributed was obtained by ascertaining first the cost of the work?

A. Yes, sir.

Q. And then by giving the interest on that at five per cent.?

A. Yes, sir.

Q. To that interest you add the running expenses of the work for the year?

A. Yes, sir.

Q. And divide that by the number of million gallons used per year?

A. Divided by three hundred and sixty-five, which gives the daily expenses. If you are using two millions of gallons per day, divide that by two.

Q. You take the interest at five per cent. on the cost, add to that the expense of running the works for the year, and the cost of maintenance, and divide that by three hundred and sixty-five; that gives you the cost per day, does it?

A. That gives the cost per day.

Q. And divide that by the number of gallons you use per day?

A. Yes, sir.

Q. That is the way those tables have been formed, is it?

A. Yes, sir.

Q. What did you say was the cost of supplying a million of gallons per day of water to the Chestnut-Hill reservoir?

A. \$45.35 per million.

Q. How did you get at that?

A. I will state that that is only an approximate estimate.

Q. I want to know the elements of the calculation.

A. You will find, by consulting the reports of the Cochituate Water Board, that they have kept the cost of the Western and Eastern Division separate. Those we will call, — one the supply system, and the other the distribution system. The cost of those are brought down to the date that this was made up, which was last year, 1882, and I deducted the cost of the Brookline reservoir from that; that is given as a separate item. Then the cost of the aqueduct from Chestnut-Hill reservoir to Brookline reservoir was a matter which I estimated. Those two I added together and deducted from the entire cost of the Western

Division. That gave me the cost of Chestnut-Hill reservoir and the works west of that. Then to that I added the estimated cost of the new basin which is now being built.

Q. How much did you estimate the cost of that to be?

A. \$400,000. That gave me the cost of the works with the new basins completed up to the reservoir, and including the reservoir. I took five per cent. of that; then to that I added the average expenditure for the cost of the works on that division, as nearly as I could pick them out from the reports, which amounted to \$25,000 or \$30,000. That comprised the entire sum, and that was divided by three hundred and sixty-five, and the number of million gallons distributed. That price is based upon thirty-one millions of gallons delivered.

Mr. RUSSELL. — If they delivered thirty-eight millions of gallons, it would be a good deal less than \$45?

A. Yes, sir.

Mr. HAMMOND. — At \$45 per million, if Cambridge should need three millions of gallons a day, that would be \$135 a day?

A. Yes, sir.

Q. And if we need five millions, it would be \$225 a day. Now, if you were a representative of the city of Boston, and Cambridge should come to you to trade for water, what do you think would be a fair way of getting at what Cambridge should pay? I mean the elements now; I am not speaking of the amount. Suppose you wanted to get at it, what elements would you use?

A. If I was a representative of the city of Boston?

Q. I want to be fair.

A. I think, perhaps, as fair a basis as any would be to base it upon the relative amount of water used by the two cities; and supposing the water cost a given sum at a given point, let the expense of that be divided between the two.

Q. It costs Boston \$45 a million to get to Chestnut-Hill reservoir, does it?

A. Yes, sir.

Q. What should be added to that? That, of course, we have got to pay anyhow; what should have to be added to that?

A. It would cost \$2 per million additional to deliver that to you,—to get it to your pipes.

Q. Do you think that Boston ought to expend from \$16,000,000 to \$20,000,000 to furnish water to Cambridge upon the simple interest of the cost of getting it to our pipes, and not consider at all what they have laid out in the principal? Should not some part of the principal come in here as an element which Cambridge ought to pay?

A. I think not.

Q. But even if she didn't charge anything more than the actual cost

to furnish us with three millions of gallons a day, the actual cost to get it to our pipes would be \$141 for three millions of gallons?

A. As a matter of fact, it does not cost anything, for Boston has a surplus of water with her present works.

Q. There are two ways of trade; one is on the theory of what a man who wants to sell will sell for, and the other is on the theory of what a man who wants to buy will pay.

A. Just so.

Q. Supposing Boston assumes to trade on the last theory, — what it would cost Cambridge to get water somewhere else, — Boston could charge \$300 or \$400 a day for the supply?

A. Yes, sir.

Q. Have you any experience, with regard to Boston, as to the basis they would be likely to adopt?

A. I do not know as I can answer that question.

Mr. RUSSELL. — How much additional cost would it be to Boston if she had thirty-eight million gallons in the Sudbury to deliver; how much more would it cost her to deliver thirty-eight million gallons at Chestnut-Hill reservoir than thirty-one million gallons?

A. Not a cent.

Q. Everything she gets from Cambridge would be clear gain, would it not?

A. Certainly.

Q. It would diminish the cost one-third if she delivered forty million instead of thirty million gallons?

A. Yes, sir.

The CHAIRMAN. — You are perfectly familiar with the water-shed of the Mystic supply, are you not?

A. Yes, sir.

Q. Have you made any estimates in your capacity as an engineer?

A. Yes, sir.

Q. From your knowledge of the population, and the nature of the soil, is it your judgment that the supply will have to be abandoned in the near future?

A. I think that it could be kept reasonably pure for a number of years.

Q. You cannot state a decided opinion, can you?

A. No, sir; I cannot.

Mr. W. G. RUSSELL. — What is your opinion of the water, as it is there now?

A. It is as good as the Sudbury, if not better.

The CHAIRMAN. — What do you base your opinion upon?

A. Upon the analyses that have been made, and the evidence of parties who have occasion to use both waters.

MR. W. G. RUSSELL. — That is the common report, is it not?

A. The residents prefer it to Sudbury water.

Q. You have been asked about the changes in that report. An admission was made in that report as originally drawn; that admission was in regard to Concord river, and was stricken out; is that not so?

A. Yes, sir; that was stricken out, but nothing was changed in the report.

Q. In your opinion, were there five lines stricken out?

A. I should think there was more than that.

MR. THOMAS DOANE.

MR. W. G. RUSSELL. — What is your profession?

A. Civil engineer.

Q. How long have you been in the profession?

A. Forty years.

Q. What have you had charge of in the way of construction and engineering?

A. Chief engineer of the Boston & Maine Railroad for twelve years, consulting engineer of the Hoosac Tunnel for eight years, and consulting engineer of the Northern Pacific Railroad.

Q. Have you made the study of water-sheds and water supply a special branch of your science?

A. Yes, sir. I have given it more or less attention.

Q. Did you take part with Mr. Crafts in making the investigation upon which this report for an additional water supply for Cambridge was founded?

A. Yes, sir.

Q. When did you first acquire a knowledge of the territory of the Stony brook?

A. At the time the Fitchburg Railroad was built, — in 1845.

Q. You were then an engineer?

A. I began my business as an engineer on that road at this place. I lived in Weston, very near to Stony brook.

Q. And therefore you became more or less familiar with this region?

A. Yes, sir.

Q. Will you state what examination you made of this Stony-brook basin, and at whose request, and for what purpose?

A. The request to look it over came to me, through Mr. Gates, from Mr. Bradlee. We spent a day in riding over Stony-brook basin. Went up to Hobbs' brook and back again on the left bank of the Stony brook, and back again on the other side.

Q. Who was with you in that examination?

A. Mr. Stephen F. Gates.

Q. Was Mr. N. Henry Crafts with you on that day?

A. He was not. At a subsequent time I looked over a part of the basin with Mr. Crafts.

Q. Was this an independent examination on your part, Mr. Doane, owing to Mr. Crafts being in New Brunswick?

A. Yes, sir.

Q. Will you go on and state what further examination you made?

A. Afterwards I went up with Mr. Crafts and made a more particular examination of the site of the proposed storage-basin, to see what arrangement could be made for other storage, both at Roberts pond and other points above.

Q. Did you have measurements made for you?

A. I think not.

Q. Did you have any further connection with Mr. Crafts, or any connection with Mr. Forbes, when you made surveys along the site of the proposed dam, and made some cross-sections? Did you make any estimates of the storage capacity?

A. I made estimates of the storage capacity.

Q. You drew a section where the dam was to be, and estimated the contents of the storage-basin from what data?

A. Took the area of the present Roberts pond and the estimated area of the pond for flooding twenty feet deeper, and made an estimate upon that basis.

Q. The present area is thirty-eight acres, is it not?

A. Yes, sir.

Q. The additional flowage, ten to twelve acres?

A. Yes, sir.

Q. What is the character of that basin as compared with other basins that had been used for water supply? Take the Sudbury and others in use.

A. I have seen two or three of the Sudbury-river basins. I think that in any basins that I know of there will be a higher proportion of shoal water than in this basin which I propose. The shores of Stony brook are steeper than any I know of.

Q. What do you consider shoal water?

A. Five feet. Seven or eight feet would be shoal; ten feet would be shoal for large basins.

Q. In estimating the proportion of any pond which was called fit for a basin, you would divide it into deep and shallow water by a line which would be upwards of five feet?

A. Yes, sir.

Q. Then, as compared with any other basins which you know, would this be a desirable basin in that point of view?

A. Better than any I know of.

Q. In regard to the water-shed and supply, it was estimated from a great number of plats?

A. A great number of plats, by drawing upon that division line between the water-sheds, as nearly as it could be done.

Q. Have you any doubt of the substantial accuracy of the estimate of the water-shed you have made?

A. No, sir; I have the various areas that were estimated.

Q. Tell us how closely you estimated that, and state whether that was done chiefly by yourself or by Mr. Crafts.

A. One was made from the city of Boston map of drainage areas about Boston, dated 1878. Four of these were made in connection with Mr. Crafts. One of them I made myself, — the lower one. They are on the Boston city map, giving twenty-two square miles; the Middlesex map, twenty-two and eight-tenths miles; the State map gave twenty-one square miles; another which I made was made from the town maps of Middlesex county by Beers, which gave me twenty-four and three-fourths square miles. All these include Sandy pond, which contains an area much greater than Little pond. The pond itself is one hundred and fifty acres. As will be seen, the lowest estimate was taken, and that was the water-shed of Stony brook, which is twenty square miles.

Q. Did you make any estimate of the Shawsheen?

A. No, sir; that was made by the City Engineers.

Q. Then as to the amount of water-shed and yield, you have no doubt that that is an estimate within bounds?

A. I think it is right.

Q. What means did you take for ascertaining the quality of the water?

A. We made no test of the quality of the water other than that made by the chemist, Dr. Wood.

Q. Did you observe the apparent character of the water?

A. Yes, sir.

Q. How does it compare with others?

A. It appears to be very good.

Q. Did you see where Dr. Wood took the samples?

A. I was sitting by him when he did take them.

Q. Those samples you saw selected?

A. No, sir; I did not.

Q. You know where they were taken from?

A. Yes, sir.

Q. Was one of them taken immediately below what is called shoddy-mill?

A. I understand they were taken between the shoddy-mill and Hobbs' brook ; somewhere within a quarter of a mile.

Q. The sample taken below the shoddy-mill must have been taken, then, within a quarter of a mile of it?

A. Yes, sir.

Q. Do you think the character of the water of that stream could be polluted by this mill being upon it?

A. I made some inquiries at the shoddy-mill, — the only place where I supposed there was any contamination from the factories.

Q. Did you examine the mill, and the operation of it?

A. Yes, sir.

Q. In your opinion is that a serious source of contamination?

A. It is very small. The total value of the mill, with the lot of land and its machinery, was only placed at \$7,000 by the assessors of Weston. There are not many employés about the mill, — not more than eight or ten. The product of the mill that went into the water was soda-ash and alum. That was all the source of contamination, except the washing of the wool, which was a very slight cause of contamination.

Q. Was the mill in operation?

A. I do not know.

Q. Then, in regard to the quality, were you satisfied that the water was of a good quality to use?

A. It seemed to me very good water.

Q. Did you form an estimate of the cost of collecting that water, and of conveying it to Fresh pond and Cambridge?

A. Yes, sir ; I joined with Mr. Crafts.

Q. Have you any reason to qualify that estimate?

A. No, sir.

Q. You would sustain it as a careful and proper estimate?

A. Yes, sir.

Q. Now, in regard to the Shawsheen basin, — did you also examine that?

A. I did. I rode up one side and down the other, from Andover to Lexington, — the whole length of it.

Q. You are familiar with the plan of the basin on the Shawsheen, are you?

A. Yes, sir.

Q. How would that basin compare with the basin on the Stony brook in respect to its fitness for the storage of water and the expense of its construction?

A. It seems to me that there must be a much larger amount of shoal water in the Shawsheen than in Stony brook. The greatest depth of water must be at the lower end, where the report says they

propose to raise the depth twenty feet. The Shawsheen must make a considerable fall between the upper and lower end, and it seems to me the greatest depth cannot be more than seventeen feet, except in the body of the river. In the upper end it is shallower; it runs down to nothing. Upon the plans it seems to abut against another dam at the upper end. The water of the pond is very low. There are a good many indentations into which the water must flow.

Q. The shallow water will be in proportion to the measurement upon the edge of the pond?

A. To a great degree.

Q. Suppose the bottom of that basin is to be cleared of all the vegetable matter and earth, would it be a serious item of expenditure?

A. Yes, sir.

Q. Is the estimate of \$600 or \$700 an acre too large an estimate for that?

A. I don't think it is.

Q. Take the basin which you propose to build on the Stony brook, — it is thirty-eight acres, and you propose to increase it twelve acres?

A. Yes, sir.

Q. Taking your knowledge of Stony brook, would you, as an engineer, advise the city of Cambridge to take that source in preference to the Shawsheen; and, if so, on what ground?

A. I should, as far as I have gone. There could not be any great question as to the quality of the water. The one is about as good as the other at the present time, and the quantity is sufficient. The basin is as large as that of Cochituate, and a little larger. It would be sufficient for Cambridge for some time to come.

Q. Estimating the storage capacity to be three hundred millions, and Fresh pond five hundred millions, would that be sufficient?

A. Yes, sir.

Q. Do you think it necessary to supply eight millions additional?

A. No, sir.

Q. With regard to the liability to future or present contamination, have you examined the territory with reference to the sparseness or density of the population upon those parts nearest the stream?

A. I have looked it all over. I have been into all the villages which lie near the water-sheds.

Q. How did you ascertain the density of the population?

A. By taking the population from the census, and counting the houses upon the map of Middlesex county made by Mr. Beers, about which I have spoken.

Q. And allowing how many persons to a house?

A. About five, dividing the population as given by the census.

Q. That gave you the average density of the population, which

you stated to be ninety-four per square mile, while on the Shawsheen it is seventy-nine?

A. Yes, sir.

Q. With reference to the mode in which that population is distributed over the territory, — with reference to its being near the streams and the source of water supply, — how do the two territories compare with each other?

A. I think the population of the Shawsheen district is more largely confined to villages than it is in Stony brook, while in Stony brook Weston is the only village in any degree close to the water-shed.

Q. As a whole, you would say the comparison was favorable to Stony brook rather than the Shawsheen?

A. Yes, sir. I made a little estimate of the acres to each house. In Stony brook it is forty-two acres to each house, while in the Shawsheen it is thirty-six to thirty-seven acres, showing an advantage largely in favor of Stony brook.

Q. Now, in relation to the Mystic. Do you live in Charlestown?

A. Yes, sir.

Q. How long have you been residing there?

A. Since 1849.

Q. Have you been using the Mystic water for your domestic use?

A. We use it for all purposes except drinking during the year, and for drinking except in the summer. I have got a well on my place which I use for drinking in summer. On the whole, we are better satisfied with it than with the Boston water.

Q. Do you know any means by which the future supply of the Mystic can be protected, beside those which have been used by the city for its present protection?

A. I do not anticipate any increase of materials which are objectionable in that water-shed. The population, of course, will increase, and in that respect it will become less reliable year after year as the territory fills up.

Q. Do you know of any objection to building further reservoirs upon that stream, if they can be constructed of the proper depth?

A. No other objection than their cost.

A COMMITTEEMAN. — You have told us your method of computing the number of acres in a water-shed; is that the method employed by engineers in making their computations?

A. That is the method adopted, except in final estimates.

Q. When the estimate was made by Mr. Davis as to the water-shed of the Shawsheen basin, is it your opinion that he pursued the same method?

A. I do not think it has ever been surveyed.

Q. The computation is the same in one case as in the other?

A. Yes, sir; the Sudbury is computed in the same way; the Mystic also in the same way. They have been surveyed since their construction.

Mr. HAMMOND. — You made a turnout there [pointing to the map]. Why did you make it?

A. I rode up these various branches.

Q. You rode up all these branches?

A. Yes, sir; I think all of them.

Q. Why didn't you go out half an inch further?

A. The lines are drawn about half way between the streams.

Q. Did you see Dr. Wood there?

A. No, sir.

Q. Did you see Mr. Barbour there?

A. No, sir.

Q. Have you had anything to say to him since you have been connected with this matter?

A. I went with Mr. Gates to see Mr. Barbour concerning information regarding the Shawsheen.

Q. Did you have any consultation with him about the Stony-brook matter?

A. No, sir; I think not.

Q. You spoke about this lower basin upon Stony brook and said it now embraced how many acres?

A. I think about thirty-eight acres.

Q. How do you get at that?

A. From an estimate made from the map and measurements made on the ground.

Q. You said that your plan contemplates raising the water?

A. Yes, sir.

Q. And that would increase the area about twelve acres?

A. Yes, sir.

Q. How did you get at that?

A. By estimation. I rode over and walked over the ground by the road that passes through that neighborhood. I made the estimate from the character of the slopes.

Q. You looked at that basin, measured the width of it, drove round it, and then judged that if you raised it so many feet it would give you about twelve acres additional?

A. Yes, sir.

Q. How did you get at the depth? I understand now that that is at present a pretty deep pond?

A. It is about eleven or twelve feet. I went with Mr. Crafts; I did the scoring while he was sounding.

Q. Did you throw the lead, or did he state to you what it was as he drew it up?

A. I saw it myself.

Q. You thought it was eleven or twelve feet?

A. That is what it was. At the time when we made the sounding it was about a foot below the dam, and the sounding was made at that low state of the water.

Q. So as to overflow its present banks, you judge it would have to be raised how many feet?

A. About twenty feet.

Q. What would be the average depth after the removal of such earth as you spoke of beyond its present limits?

A. The average depth beyond its present limit would be ten feet.

Q. That would be a pretty shallow basin, would it not?

A. That is rather a small proportion.

Q. Then that reservoir, as you propose to build it, would have thirty-five acres of water over ten feet, and twelve acres of it would be only ten feet deep?

A. Yes, sir. Half of that margin would be less than ten feet, and the other half would be over ten feet.

Q. You think that would be a suitable storage-basin, do you?

A. Yes, sir, undoubtedly so.

Q. How did you get at the estimate of the quantity of earth that would have to be removed?

A. Judging from the character of the soil in the vicinity, and from the surroundings, I thought six inches would be enough.

Q. It looked to you like ordinary farm land?

A. Yes, sir.

Q. The Roberts mill is at the foot of this pond, is it not?

A. Yes, sir.

Q. And Sibley mill is at the head of it?

A. Yes, sir.

Q. What sort of a mill is that?

A. They make cotton machinery.

Q. Then you spoke about the shoddy-mill about on a line between Weston and Waltham?

A. No, sir; there it is (referring to the map). Just above the shoddy-mill there is a wheelwright's shop driven by water. There is another mill used for making chairs and school-furniture.

Q. Are there any other mills?

A. I do not think of any other.

Q. If you were going to adopt that system of supply, what would you do, or advise to be done, about those mills?

A. I think it would be a good plan to buy out the shoddy-mill or

change it to some other production. None of the other mills are objectionable.

Q. Do you think it would be best to buy them all?

A. It would be best to buy them all.

Q. If you were going to advise Cambridge to take this supply, you would certainly advise her to control that water-power?

A. Yes, sir.

Q. And, in order to do that, it is necessary to buy those mills?

A. The water-power at Roberts' mill could be easily compromised.

Q. Taking into consideration the chances for present and future contamination, which should you recommend, the Shawsheen or this new scheme?

A. I think the chances for contamination are a little in favor of Shawsheen.

Mr. W. G. RUSSELL. — That represents where the water would be confined, does it? [referring to map.]

A. Yes, sir.

ARTHUR W. FORBES.

Mr. W. G. RUSSELL. — What is your occupation?

A. Civil engineer.

Q. How long have you been in the profession?

A. Twelve years.

Q. You joined in and signed this report?

A. I did.

Q. You are a partner with Mr. Crafts in business, are you not?

A. Yes, sir.

Q. State what part you took in the examination of this territory and making this report.

A. I went up with Mr. Crafts and Mr. Gates to make an examination about the brook from Roberts pond to Weston station. Went again with Dr. Wood, Mr. Gates, Mr. Crafts, and Mr. Barbour, and went over nearly the same territory.

Q. Did you see Dr. Wood take his samples?

A. I saw Dr. Wood take his samples from the basin. I saw two of the samples, and drank some of the water at the times when he took them.

Q. Did you see the sample taken from below the shoddy-mill?

A. I saw the sample taken from below the shoddy-mill, Hobbs' brook, and at Sibley's dam.

Q. Do you know whether the shoddy-mill was in operation that day?

A. I think it was.

Q. What further examination of territory did you make?

A. I made the preliminary surveys with Mr. Doane ; took soundings where the dam was proposed to be put ; made levels from the dam to Watertown, and connected with the surveys of Mr. Crafts, — that was for the conduit from the proposed reservoir ; then I made profiles of the ground, and went over the calculations with Mr. Crafts.

Q. Have you examined it sufficiently to form an opinion as to whether the measurement of the water-shed is accurate?

A. Yes, sir ; in the same way I made it on the plan and calculated it with Mr. Doane.

Q. Have you any doubt in the substantial accuracy of that measurement, or that it will come up to twenty miles?

A. [Stenographer could not hear answer on account of conversation passing between Mr. Bullard and Mr. Hammond.]

Q. Then, in regard to the supply, — have you made your estimate as to that?

A. Yes, sir.

Q. What do you compute the capacity to be?

A. Three hundred millions of gallons.

Q. And the daily supply, what was that?

A. The conduit would more than supply six millions a day.

Q. Did you make an estimate as to the population?

A. I went over the map with Mr. Doane, and made computation with him. I made it separately, and then compared it with his.

Q. Is there anything in that report which you wish to qualify?

A. No, sir ; nothing. I think if the project were carried out it might be modified.

Q. You think the route could be shortened?

A. I think so.

Q. What route did you adopt?

A. We followed the line of the Charles river, and when we came to the cemetery we were obliged to go around it. If permission were granted to go through it the distance might be shortened considerably.

Mr. HAMMOND. — You never saw Mr. Barbour in connection with this matter, except that one time when he went with you and Dr. Wood?

A. No, sir. I had some conversation with him at the time we met at the stream.

Q. Do you remember when that was? I see that Dr. Wood's analysis is dated October 7th.

A. I think it was something like that. I believe that is the date of his collection of samples. I spoke to Mr. Barbour at the time about the quantity of the water that seemed to be then passing over the dam.

Q. I do not understand that you made any soundings on the territory, or had any other sources of information, except those described by Mr. Doane?

A. None.

Q. Do I understand you to say that you have verified yourself the computations made in the report?

A. All the essential features of it.

Mr. CRAFTS. — *Recalled.*

Mr. W. G. RUSSELL. — There is an act authorizing Waltham to take the waters of Charles river or Stony brook. Can you state what she has done?

A. Waltham has built her works, and exercised her option some ten years ago, — I think prior to 1874.

Q. That is, she took the water from the Charles river?

A. Yes, sir.

Q. Has she a satisfactory and ample supply?

A. I believe so.

Mr. HAMMOND. — Waltham took the water of the Charles river when she had the right to take the water from Stony brook?

A. Yes, sir.

Q. Why?

A. On account of the expense. I have read the report which was made.

Q. By whom?

A. Mr. Curtis, the engineer.

Q. Employed by the town?

A. Yes, sir; employed by the town.

Q. What did Waltham do to get the water; what change did she make in the surface of the earth?

A. She excavated on the land side, and filled out and made embankments in the expectation that the water would filter through and give a thorough supply in that way.

Q. How much does Waltham use?

A. I think about six or seven hundred thousand gallons a day. It was authorized to take one million. I think that is their report.

Q. You think that they chose the Charles river because it was less expensive?

A. I think that was the cause. Possibly the damages at Roberts' mill might have influenced them in favor of Charles river.

Q. I think you stated the other day, in answer to my inquiry, that immediately below the junction of Stony brook and Charles river

there were several manufactories which derived their power from Charles river?

A. I do not know that I stated power.

Q. How did you get at the mill-damages?

A. We usually estimate by the volume of water diverted from the stream; if the whole stream is taken, they pay for the whole.

Q. You have made no estimate about the mill-damages this year, have you?

A. I think I have.

Q. Have you got it with you?

A. I have.

Q. Will you let us have it?

A. Do you want the round sum?

Q. I would like to go through it just as your mind went through it.

A. I call it, in round numbers, \$50 per annum. That was the basis upon which that award was made. Apply that as the basis, and multiplied by six would give the damages on that basis which Cambridge would have to pay.

Q. How much did you make the damages? This takes into account the additional fall of sixteen feet on the part of Cambridge, which would make \$69,500 that Cambridge would have to pay the mill-owners on the Charles river?

A. Yes, sir.

Q. On the same basis that Waltham paid?

A. Yes, sir.

Q. The only decided difference in the calculation between Waltham and Cambridge is in the amount of the fall of water?

A. That is all.

Q. Multiply the amount Waltham has paid by six and that will give what Cambridge has to pay?

A. Yes, sir.

Q. Then you have calculated that as Cambridge took it from a higher place she ought to pay more?

A. Yes, sir.

Q. That intricate calculation that you have gone into was on the basis that Cambridge took it from a higher place?

A. Yes, sir. There are no mill-damages in Stony brook, except the Roberts mill, and that I have included in my estimate.

Q. That was one of the things that counsel struck out, was it?

A. No, sir; no changes were made in any estimate.

Q. Do you mean to say that the \$70,000 includes the damages to be paid to all the mill-owners on the Charles river that would be affected by this taking of the water, and also the damages to Sibley and Roberts' mill, and nothing else?

A. Nothing else.

Q. What have you to say about the mill-power above? Mr. Doane said that he thought it best to control the water-power above. Have you included in your bill of expenses anything for that?

A. No, sir. We may, perhaps, do a little in regard to that pond. I should not buy out the establishment if we could get rid of the nuisance.

Q. About the mill-damages; they have never entered into any estimate for damages, have they?

A. No, sir.

Q. How is it with the Stony brook, — take it in the rough, — would it be higher or lower on the Shawsheen?

A. Higher.

Q. How about the mills above the dam that could be bought out?

A. I think there is one, — the shoddy mill.

Mr. HAMMOND. — I want to put in, Mr. Chairman and gentlemen, the water receipts of Cambridge, which are as follows: —

1878	.	.	.	.	.	.	.	.	.	\$159,899 74
1879	.	.	.	.	.	.	.	.	.	168,625 51
1880	.	.	.	.	.	.	.	.	.	175,761 67
1881	.	.	.	.	.	.	.	.	.	170,897 23
1882	.	.	.	.	.	.	.	.	.	179,484 17

Adjourned for Argument to Thursday, March 15, 1883.

CLOSING ARGUMENT OF HON. R. M. MORSE, JR.,

IN BEHALF OF THE SMITH & DOVE MANUFACTURING CO.

I assume that this committee, in dealing with the important questions presented by these petitions, will have regard solely to the public interest. We all know that the committee is composed largely of gentlemen representing immediately three of the cities and towns that are concerned in this proposed legislation; but I shall not believe that a citizen of Andover, or of Cambridge, or of Boston, in acting in his official position here, will be governed, primarily, by the fact that his city or town is a party to the controversy. First, because, as he very well knows, there is frequently a division of opinion at home in regard to the merits of the proposed question; and the fact that official action is taken is never by any means conclusive in regard to the real public feeling upon the subject; and, secondly, because local considerations are so often opposed to the larger and more important public interest. So that I come to this matter with entire confidence that these questions will be dealt with fairly upon their merits; and that, irrespective of whether one's immediate constituents are or are not satisfied with the result to which the committee come, the general policy which the committee will lay down, and which it will advise the Legislature to adopt, will be one which, in other cases affecting other localities, they would advocate with the same force.

The questions, Mr. Chairman, in the main, are old ones. They have come before this committee, or the predecessors of the gentlemen composing this committee, for several years, though the form in which they have been presented has been varied. This year there are one or two new elements in the discussion. The main question, as regards the matter of the appropriation of this river for a water-supply, has been frequently discussed before. Before coming immediately to that, I want the committee to note that the whole tendency of legislation during the last few years has been to exercise greater caution in reference, first, to the matter of granting a right to take water; and, secondly, to making provision for the care of the drainage and sewerage of the cities and towns. If any one will take the trouble to go back to the early days of legislation upon the subject of water, he will find that it proceeded upon the theory that only very large communities, like the city of Boston, for instance, would be likely to require an artificial supply; I mean to say, within any reasonable length of time; and therefore there was no need of exercising great

caution in granting rights. A city or town, in those early days, had nothing to do but to come to the Legislature and present its petition, and say that it wanted this or that river, this pond or that pond, for its water-supply, and the petition was forthwith granted. Remonstrants were treated as of no account; mill-owners were not to be considered, and the local interests of the communities specially injured were regarded as of comparative unimportance. But in the course of time, as we all know, the demand for an artificial supply of water has increased, until now almost every community of this State, large and small, is looking for a system by which it can furnish water to its inhabitants through pipes, so that now it behooves every committee before whom these questions shall come to legislate, not with regard specially or solely to the petitioning city or town, as the case may be, but to the communities that may be in any way affected by the petition, or by the precedent that may be set by the legislation in the particular case. And so with respect to the matter of drainage. I was very glad to hear a member of this committee say, in open hearing, that the committee had reached the conclusion that they would not permit water to be taken from a river and to be returned to it unless adequate provision was made for the prevention of pollution; and I felt that the time that was spent before this committee last year and the year before, in the case of the Blackstone river, and in other cases, was well spent in demonstrating, not only to the committee, but to the public, the necessity of adequate provision in that respect. I say, therefore, that any committee of the Legislature will approach all these questions to-day, whether of water supply or of pollution of streams, in a very different spirit from what they did fifteen or twenty years ago; and that just as in this matter of preparing basins for the supply of water, experience has shown that a far greater expense must be incurred than was formerly supposed necessary, so, in respect to water supply, it is to be treated no longer as a mere local question to be determined solely by reference to the demands of the petitioning town or city, but as one requiring a broad consideration of all the interests involved.

Now, Mr. Chairmam, there are three petitions in this case for the use of the Shawsheen. I have nothing to say in regard to the petition of the town of Andover, because I assume that the demand of that town would be so inconsiderable that it would not affect seriously either of the interests which I immediately represent — those of one of the manufacturing companies there, the Smith & Dove Manufacturing Company — or the general enjoyment of the river by the people of the town of Andover; and I suppose it is quite safe to leave to that town the management of its water supply, under such a bill as this committee shall grant, if it grants any. But I do oppose most decidedly the

petitions of Boston and Cambridge, not merely upon considerations personal to my clients, but because I believe, first, that the bills, if they should be passed, would never be acted upon by either city ; they would be mere dead-letters upon the statute book ; and, secondly, because, if they should be acted upon, they would involve a very unnecessary expense, and cause needless damage and injury. I have said before in this hearing, and I said it last year, that there is no doubt that the city of Cambridge needs a further supply of water. There is no question that they have shown the very best capacity, the very best intelligence in the way of managing the supply which they have, and the highest degree of economy ; nothing that can be claimed by my brother Hammond in behalf of the city of Cambridge will be disputed by me in that regard. I shall assume that the city of Cambridge shows a necessity for something in the way of further water supply.

In regard to the city of Boston the case is entirely different, and although I cannot venture to testify as a citizen of Boston, because, as I understand from brother Hammond, I should thereby expose myself to cross-examination —

Mr. HAMMOND. — Oh, no.

Mr. MORSE. — Yet I think I may fairly assume to say, with some knowledge of public matters, that there was never a more groundless proceeding started in behalf of the city of Boston than this application for the Shawsheen. I shall say something in a moment in regard to the necessities of the city of Boston, but I want to ask the committee, as intelligent men, whether they believe that, if that city really wanted this water supply, we should have had the beggarly display that we have had here in behalf of the city government. There is not the first particle of interest on the part of the city government of Boston in behalf of this measure. I will venture to say that of the three hundred and fifty thousand or three hundred and seventy-five thousand inhabitants of the city of Boston you could hardly find a dozen men outside of the counsel for the city and the Water Board who know that such an application is pending at the State House as this petition to take the Shawsheen ; and if it were to be spoken of in the newspapers to-morrow as a matter which was actually being passed here, it would excite general surprise on the part of the inhabitants. Why, we have been told for years that the supplies from the Cochituate, as supplemented by the Sudbury and by the Mystic, were ample for years to come. Take up any report you please of the Water Board of the city of Boston, and you will find that that is the burden of their story. You will find that in every measure that has been advocated of recent years in the City Council in reference to the building of additional basins, the whole talk has been that the natural

supply was sufficient, but that the basins must be increased in number or improved.

I do not wish to violate any private confidence, and I will not mention any name; but I will say that, speaking to a very high official of this city a few weeks ago, I said to him, "What do you think in regard to the application of the city of Boston to take the water of the Shawsheen?"—"Why," said he, "I have never looked into it."—"Well," said I, "don't you know that there is a hearing going on in which the city authorities are applying to a committee of the Legislature for the right to take this river?" He said no, but that he would see the City Solicitor and find out what it was all about. Go down to the thronged corridors of City Hall to-day, and inquire of the persons who are there frequenting those places, and you will find that they do not know that the subject is being considered.

Now, whom have you had here? The Mayor of Boston has not been here; no committee on the part of the City Council has been here; not an Alderman, nor a member of the Common Council; nobody except the City Engineer, who came here, as I think the committee will believe, rather reluctantly; and finally, after a great deal of spurring and suggestion, a member of the Water Board, who was the least acquainted with the whole subject, was induced to put in an appearance; and that gentleman, whom we all respect as an individual, had to say that he had been on the Water Board only about six or seven months, and that he was not one of those who had made the last report of that Board, and of course had not been familiar with the official action of that Board during the last few years. The chairman of the Board was not here, nor his associate, who has been thoroughly acquainted with the water necessities of the city of Boston during the last fifteen or twenty years. In other words, Mr. Chairman, I have a right to say, and I say it with due respect to the gentlemen who represent Boston, whether from the Senate or the House, on this committee, that they have no evidence before them that the city of Boston, through its Mayor, through its City Council, through any organized action outside of the Water Board, has any interest whatever in this question.

Now, the Water Board, unquestionably, when they learned that the city of Cambridge intended to make this application for the Shawsheen, thought that it would be a good opportunity for them to foreclose on the city of Cambridge. They felt that if they got the control of the Shawsheen it would put them in a better position in regard to a trade with the city of Cambridge about water. But I do not believe, notwithstanding what was said here the other day by Mr. Sawyer, that, if this bill should be passed, the Water Board of Boston would ever recommend the adoption of so expensive a scheme as taking this

Shawsheen river, in view of the small amount of water that would be obtained there. At all events, there is nothing as yet to indicate that there is any public feeling in its favor, or any demand on the part of the authorities of the city of Boston for it.

Now, Mr. Chairman, having said this much in reference to the interest in the question, and having shown, as I think we have shown during this hearing, that there is nobody in the city of Boston who cares about the matter, not even the Water Board, — and as they are so soon to be removed I do not suppose that their official interest is a matter of much consequence any longer, — having shown that, I now ask the committee to consider what are the real necessities of the city of Boston. The testimony which will be placed before you in print, and of which you have now a pretty clear recollection, I assume, shows that the capacity of the Cochituate and the Sudbury systems is fifty-two million gallons a day, and that the capacity of the Mystic system is seventeen million gallons a day.

There was some discrepancy in regard to these last figures. Mr. Wightman put it at twelve millions, while Mr. Sawyer said that the Water Board reckoned it at seventeen millions. There is no doubt that seventeen million gallons has been the estimate of most of the engineers who have examined into the matter. It follows, then, that the aggregate water supply which the city of Boston can obtain from the rivers which it now has paid damages for taking is sixty-nine million gallons a day. Of course the actual quantity of water that flows down these rivers is very much greater than this; but I am now stating what can be stored in such basins as have been either actually built or contemplated by the engineers. The storage capacity, the amount that it is entirely feasible to retain and distribute, is, say, seventy million gallons a day from the Sudbury, the Cochituate, and the Mystic. Further, it is practicable, if it should be deemed necessary at any time, to combine these two systems, and to have one supplement the other as the emergency might require; so that, for the purposes of this hearing, it is fair to deal with this matter, as a supply, on the whole, of something like seventy million gallons a day.

Now, the entire population of the district at present supplied with water by the city of Boston, including, I mean, the adjacent cities and towns, is about four hundred thousand. If I recollect Mr. Wightman's figures correctly, he assumes that it would take thirty or forty years for the population of that district to reach the number of eight hundred and fifty thousand; consequently, as he himself stated, the present water supply of Boston, from the Cochituate and Sudbury alone, by the completion of the additional reservoirs which have been projected by the engineers, and estimated upon, will enable the city for the next forty years to provide an adequate sup-

ply of water, provided the consumption is limited to that amount which experience has shown to be a large estimate, — that is, sixty gallons per head per day. Last year it was shown in more detail than it has been this winter that the consumption of water in Boston is very extravagant. Mr. Wightman himself conceded it. He said that it amounted to about ninety gallons per head per day; that he regarded that as waste to the extent of one-third; and that he had for years done what he could in the way of recommendation and suggestion to prevent it. Any one familiar with the proceedings of our city government knows that there is no subject upon which the mayors of the city have discoursed at greater length than this matter of waste of water. It was the subject of a proclamation issued by His Honor Mayor Prince year before last. It was specially referred to by the present Mayor in his inaugural, and it has been discussed at various times at meetings of the City Council, and it has received frequent newspaper comment. In other words, this city has been using water almost to the extent that the cities upon the great lakes have used it, where they have been able to take their supply, as in the case of Chicago, out of the lake in an unlimited quantity without injury to anybody, returning it when they have used it to the same lake; where there is nothing to pay for the water, and the only cost is that of the engineering. In those places the consumption of water, as you may naturally assume, is very large. There is no occasion to restrict it; and if faucets are left open and pipes run at night through the winter months or at any other time, nobody complains, nobody is injured by it.

But when you consider that Boston, and every other city in this part of the country, must depend upon a supply that is limited, and that the limits cannot be transgressed without affecting somebody's rights, you see the necessity for the application of some system of meterage, or inspection, by which that consumption shall be reduced. Now, it will be found by reference to the testimony given last year, — and those gentlemen who were not upon the committee last year may find it useful to refer to that testimony, — that it was shown that perfectly practicable systems have been devised, both of inspection and of meterage; inspection, which, as I understand it, is applied rather to districts than to individual houses, for the purpose of detecting leaks and wastes; and meterage, which of course can be applied best in large establishments, like manufactories and others, where a considerable quantity of water is used, and where the expense of the meter is not, therefore, disproportionately large. But some system can be adopted; systems have been adopted. The city of Cambridge is one of the best illustrations of what can be done by careful supervision; and there the consumption has been brought down to between

forty-four and forty-five gallons per day per head. On one side of the river, the city of Cambridge, with as many manufacturing establishments, I am inclined to think, in proportion to the private dwellings, as the city of Boston, or almost as many, is using to-day only one-half as much water per head as the city of Boston.

Mr. HAMMOND. — We furnish water to the railroads and sugar refineries.

Mr. MORSE. — It was suggested last year that there was a large number of transient visitors in Boston, and that they drank up the water to this great amount; but I have never been able to verify that by any facts that have come to my knowledge, and it has certainly not been shown in proof. I think that we must all agree with Mr. Wightman that there has been a defect in the system in Boston; and when the new Water Board, which is soon to be appointed, as we all understand, enter upon their duties, one of the first things to which they must necessarily give attention is the reduction of the consumption; and I have no question that practical men, with experience in these matters, will be able to find a remedy. But I submit to the committee, that no committee, and no Legislature, will ever grant a law authorizing the city of Boston to take another pond, or river, or brook, for water supply until it has shown reasonable economy in dealing with what it has. I mean that, not solely with reference to the public interest, but with reference to the city of Boston itself. It is encouraging extravagance in the city of Boston to give the authorities a right to take another water supply, with all the expenses consequent upon that, when they have a water supply at present which they do not use with true economy. I believe that no committee will ever do that. I believe that if this committee was composed exclusively of citizens of Boston, they would take the same view, — that it is not wise economy, that it is not for the interest of the city of Boston, that any such permission should be granted. The instant that any bill of this kind is passed there will be persons with private interests in regard to the matter endeavoring to influence some action on the part of the city government to carry out this new scheme for an additional water supply. I have said, and the testimony shows, that the city of Boston is at present authorized to take water from rivers having a capacity sufficient to furnish to a population of eight hundred and fifty thousand persons sixty gallons a day, even without regard, I may say, to the Mystic supply. To repeat, fifty-one or fifty-two million gallons a day, which is the capacity of the Sudbury and Cochituate systems alone, would supply sixty gallons a day per head to a population of eight hundred thousand, or eight hundred and fifty thousand people. If you add to that the capacity of the Mystic, you certainly get a quantity sufficient to give to all the people that

are likely to live within the limits of Boston, and of the towns adjacent to Boston, now furnished by it (and I will add the city of Cambridge also), all the water they will need for the next forty or fifty years.

Then a word with reference to the quality of this water, because some suggestion has been made that the city of Boston will be obliged to give up one or both of its present water supplies on account of its bad quality ; and that is one reason which is presented why the city of Cambridge should not undertake to use the water of the city of Boston. Now, Mr. Chairman, there is no doubt that complaint has been made of the quality of the water ; but that is a complaint, I suppose, that always will be made to a greater or less extent, in regard to any water during the first few years after the basins have been constructed. Certainly such complaints will be made, and will be proper complaints, until experience has shown a more thorough system of constructing basins than has yet been adopted. The complaint in regard to the Mystic, as you will observe, was made some years ago when the basins were newer, and, also, it is true, when there was very improper drainage into the sources of the lake ; but the testimony of Mr. Sawyer, of the Water Board, was, that there had been no complaint during the last two years, and I read in his presence to the committee, and he confirmed it, an extract from the very last report of the Water Board, in which the Board stated that the quality of the water during the last two years had been good. I think that if there were any serious trouble in regard to that water we should have heard of it. I call to mind the very important fact that the commission that was appointed by the city government of last year to investigate the trouble with the water supply of Boston reported that they did not feel it necessary to examine in regard to the quality of the Mystic water, because no complaint had been made in regard to it, and that all they gave attention to was the Sudbury. I agree, of course, that as population increases upon the Mystic, or in that locality, there will be more danger of pollution. I agree that the city of Boston will have to be upon the alert all the time to prevent injury to its water supply, and every city must always be on the alert to protect itself against harm of that kind. It is only a comparison of dangers. Even this valley of the Shawsheen must to some extent increase in population. There will be more or less manufacturing establishments upon it ; and, as time goes on, the river will become more and more polluted.

Therefore, while agreeing that there is a difference between rivers and basins and water-sheds, and that some are preferable to others, I say that where the city of Boston has invested such a large sum of money as it has done in this Mystic water system, it is hardly conceivable that it would be true economy to abandon that system and

to adopt an entirely new one in its place. On the contrary, I claim that the money would be more judiciously spent in protecting its present system from pollution.

There is no complaint, as I understand, in regard to the Cochituate. There has been, and is now, some complaint in regard to the drainage into it. That is a matter which, if the legislation is not at present sufficient to remedy, I believe legislation will finally provide for; but as regards the quality of the water, in its natural basin, I assume that it is good. I believe all accounts agree in that.

Then, in reference to the Sudbury, the whole trouble appears to come from the basins recently constructed, and the explanation has been given here, and there is no difference of opinion about it, that that is due to the fact that the soil was not removed before the lands were flowed. Now, that is a trouble simply incident to the mode of construction. It is not due to the peculiar character of the region; it does not arise from imperfections in the natural qualities of the water; and I assume that the city of Boston is determined to remedy the evil, and that it will remedy it. I have no question that the first important work that the new Water Board will take up, and one for which they will be specially appointed, will be that of improving the quality of the water by remedying the evils that now exist there. Therefore, I think that the apprehensions of our friends from Cambridge, in regard to the quality of the water which they would get if they should take it from Boston, may be dismissed altogether. I think that our own people in Boston may feel sure that the water which we shall drink during the next half century will be as clean and pure as it is practicable for water to be. I shall not assume that a city which claims, and properly claims, the preëminence that Boston does is going to permit the water furnished to its inhabitants, for all the purposes for which they require it, to be inferior in quality to that which is enjoyed by smaller communities or communities in other parts of the country. There is no question about that. The quality of the water will be brought to the proper standard, and will be kept at the proper standard; and any city officials that permit it to fall below that standard will be pretty sure to lose their official positions.

I have, therefore, Mr. Chairman, as I conceive, shown to the committee that there is a large and an ample supply authorized by law for the city of Boston; that the city of Boston has paid its damages to acquire that supply; that it has constructed its systems of water works; and that the only troubles in reference to the supply are those which arise from defects in the original construction of the works, or possibly from carelessness in the present management, and from waste in the distribution of the water. Those are evils which can be remedied, and will be remedied; and when remedied, the city of Boston will

have a supply ample for all its own needs and for the needs of the city of Cambridge, of Everett, and of Somerville, for the next half century. In the interests of true economy for the city of Boston, without regard at present to any other consideration, I submit to the committee that there is no occasion for any legislation upon the matter of this petition.

Now, having discussed the needs of the city of Boston, I ask the attention of the committee for one moment to the needs of the city of Cambridge as affected by that discussion. My proposition is that, in view of the present relations of the city of Cambridge to the city of Boston; of the fact that at present it is actually connected by its water-pipe with the city of Boston; of the fact that the existing legislation, to which I have called attention during the hearing, is adequate, in my opinion, to permit an arrangement between those two cities for water; and of the further fact that, if that legislation is not sufficient, there is no question that any committee will report, and any Legislature will pass, an enabling act permitting those two cities to make a contract in regard to the use of water,—the judgment of the committee of last year was a sound and correct one, to wit: that the city of Cambridge should seek to obtain the additional supply of water that it needs from the city of Boston. If it should be found that that supply could not be furnished, or would not be furnished upon reasonable terms, then there would be a good case upon which to come before the Legislature. That was the judgment of the committee of last year, and it was adopted by the Legislature with substantial unanimity, after careful consideration.

I now ask this committee whether, upon the evidence presented here, they think that a reasonable effort has been made to meet the requirements of the Legislature on that point? What are the facts? The Legislature of last year adjourned some time in May, I think. This matter was acted upon finally some time before its adjournment. From that time, all through the dry season of 1882, and until late in the autumn of last year, nothing whatever was done on the part of anybody connected with the Cambridge city government.

Now, it is said that Mr. Carter, the excellent chairman of that Board, was sick during a large part of the year; but of course that need not have delayed the official action of the Water Board of Cambridge. It would not explain why the Mayor, or any officials who really believed that the city of Cambridge was likely to suffer from a water famine, should not have taken some steps to find out what the city of Boston would do. Yet you find that nothing was done until late in the autumn, when a note was written, and an appointment was made with the city authorities of Boston for a meeting in December. It turned out that the day appointed was the day of the

municipal election in Cambridge, and on that account the meeting was postponed. No further attempt was made during the existence of the city governments of the two cities of last year to bring about a meeting; but it appears that this year the committee of the city of Boston itself took the initiative by writing a note to the city authorities of Cambridge, stating that they found upon their files, among the unfinished matters of last year, this communication relating to the water supply, and suggesting that a meeting should be held in reference to the matter. That note was written, I think, the last of January. There was some reply made to it in February; but, although this committee has been in session upon this matter at intervals during, I think it is safe to say, six weeks, — I do not know but a longer period, — there is no evidence that those two committees have been able or have been disposed to get together.

Mayor Fox said that there was no disposition that he could see on the part of the city authorities of Boston to meet him in any other than a courteous spirit. There is no personal ill-feeling at the bottom of this matter. There is the curious fact, however, that two communities, living as near to each other as Cambridge and Boston, with the distinct intimation that the city of Boston is disposed to treat with the city of Cambridge upon reasonable terms for the supply of water, and with the intimation upon the part of the city of Cambridge that it is almost dying for water, — there is the singular fact, I say, that no meeting has taken place, and no attempt has been made to bring about an agreement. I asked Mayor Fox, when he was before the committee, the question whether, if the Legislature should pass the bill which the city of Cambridge asks for, he would, as Mayor of Cambridge, recommend to the citizens of Cambridge that they should go to the expense of taking the Shawsheen until after they had made some application to the city of Boston. He said, in answer to that, that he personally was opposed to any other plan than taking the Shawsheen; he thought Cambridge should have a water supply of its own. But this idea of a water supply of its own is, after all, a matter of very small importance. If the city of Cambridge can get an additional supply from the city of Boston at a cost which, as I recollect it, has been figured here at something like \$30,000 or \$40,000 a year only, it seems to me that there is hardly a man in Cambridge who would dare to advocate the incurring of the great cost of the Shawsheen. When I state the amount that it would cost Cambridge to take water from Boston, I am aware that no officials of the city of Boston have made an estimate. They naturally are reluctant to give figures, because they might be used to their disadvantage in negotiations hereafter. I appreciate the motive which would prevent Mr. Wightman, or any other official of Boston, from stating here what he would

recommend as a proper sum to be paid. Indeed, I do not know that he had taken into account all the considerations; but the figures which we made among ourselves, based upon the actual cost to the city of Boston, with the addition of a reasonable profit, amounted, as I recollect them now, to between \$30,000 and \$40,000 a year. At all events, if you will take into account the fact that to furnish to the city of Cambridge one million gallons a day, which is all that the city of Cambridge asks for at present, is the merest bagatelle in the world out of a supply say of seventy million gallons a day; when you consider that to furnish one million gallons a day would be to give perhaps only one-twelfth of the amount that could be saved of the waste, — you will perceive that it is a matter of slight importance to the city of Boston to allow that quantity to go to Cambridge, and the only amount that the city of Cambridge ought to pay for the water is what it would reasonably cost to the city of Boston to furnish it. That is a matter of easy computation, and I cannot believe that the Water Boards of Boston and Cambridge, if they look at the question in the fair spirit with which I have no doubt they will deal with it, will have any serious difference about that.

Then some reflection has been made about the “grasping spirit” of the city of Boston in respect to its water contracts. Very little, I think, can be made of that; indeed, I can hardly believe that my brother Hammond will consider it worth while to refer to it. But what is the fact? The city of Boston has never made any contracts, as I understand, for the supply of water. Before the annexation of Charlestown to Boston that city had made certain contracts for the supply of water, and those were based upon the conditions that existed at that time. What they were I do not know, and none of us know. It is sufficient to say that at the time the communities interested felt that they were reasonable contracts to make. They were made, and the city of Boston has done nothing — my brother Bailey will correct me if I am misstating this — the city of Boston has done nothing since then except to live up to the contracts that were then made. Is not that the fact, brother Bailey?

Mr. BAILEY. — That is so.

Mr. MORSE. — So any suggestion that the city of Boston is not disposed to deal as reasonably with other communities as is any other municipal corporation is certainly not well founded, as far as it is based upon the history of these water contracts.

Mr. HAMMOND. — You forget that the evidence last year was, that when we went to them to see if they would furnish us with water, and on what terms, they spoke of those contracts in a very ominous manner.

Mr. BAILEY. — Who spoke of them?

Mr. HAMMOND. — The Water Board.

MR. BAILEY. — There is no evidence of that.

MR. HAMMOND. — Give me the book.

MR. MORSE. — I think, at all events, that the power of those people who frightened the city authorities of Cambridge is passing from them, and my friend may be assured that no such persons will be allowed to run the new water department.

MR. HAMMOND. — The power is passing from them because they have not been sharp enough.

MR. MORSE. — According to my brother Hammond's argument last year, it would be impossible to sharpen up the city authorities of Boston to a higher point than that they had then reached. He then spoke of them as being very dreadful people. The fact is that the officials of Boston are very much like the rest of us; and it is simply inconceivable that if an application be made on the part of Cambridge for a small supply like that of one million gallons a day, — when it can be demonstrated that twelve times that amount can be saved in the greater economy of its present water supply, — it is perfect nonsense to assume that the city of Boston will not be very happy to sell that small fraction of its savings to the city of Cambridge.

I consider, therefore, that it is clearly shown that the city of Cambridge can obtain a sufficient water supply in that way. Certainly they can obtain a supply sufficient to tide them over any emergency. There is no danger of a water famine in Cambridge. At any moment that an appeal shall come from that suffering city on account of a lack of water, there is no doubt that the gates would be opened, and that the present pipe which connects Boston and Cambridge would be allowed to distribute water to Cambridge.

There is another consideration which is entirely new at this hearing, and that is the suggestion of another independent supply for the city of Cambridge. The credit of discovering that supply belongs primarily to Captain Bradlee, and under him to the engineers whom he has employed to make investigations; and it would not be right or fair for me to anticipate in any degree the argument which will unquestionably be addressed to you by his counsel in regard to the merits of that system. I have no question that the learned counsel who represents him will be able to show to the committee that if it is a necessity for the city of Cambridge to get a new and independent water supply, it can be obtained from Stony brook at one-half the cost of the Shawsheen.

Now, Mr. Chairman, I have said all I desire to say in regard to the requirements of these two cities. I have also urged upon the committee the fact that the city of Cambridge is capable of obtaining a supply with better economy by going either to the city of Boston or to Stony brook.

I wish, in closing, to say a word in defence of the special interests

which I represent, which will be destroyed if this bill should be passed and acted upon. I say "this bill," and yet I am met with the difficulty that we have experienced before in these hearings, that there is no bill before the committee. I have frequently heard it said by committees that they would not hear a question until a bill was presented by the petitioners, — that until something was formulated which was definite and clear, they would not consume their valuable time in hearing a discussion; and it seems to me that, if there was ever a case in which a committee would have been justified in laying down a strict rule in that regard, it is this case, because the subject is not a new one, and there is no lack of eminent legal talent to put in form any measure which these respective municipalities actually want, or think they want. And yet, Mr. Chairman, you find our shrewd, ingenious, and learned friends opposite lying very low in regard to the form of their bill. They do not intend that we shall see any bill; we never shall see it; we never have seen a bill from them until after the hearing was closed.

Mr. HAMMOND. — I presented last year a bill, the first thing I did.

Mr. MORSE. — Then my brother thought it was a dangerous precedent, and has not followed it this year.

Mr. HAMMOND. — If I should put in a bill providing that that water should be paid for as so much gold, they would object to it.

Mr. MORSE. — My brother is always very successful in the turn that he is able to give to any comment that is made upon his course.

Mr. HAMMOND. — That is an argumentative complaint, not a very sincere one.

Mr. MORSE. — I have only to say that we have not had a bill before us, and the committee do not know to-day in what form the city of Boston or the city of Cambridge desires to take the Shawsheen; but we have had some intimation, which, following the suggestion of my learned friend, I shall call "ominous" in respect to what they want. They said last year that, in their generosity, they proposed to allow ten million gallons a day to flow over the dam down the river. That was a concession, first, to the manufacturers of Andover; secondly, to the people of Andover, who wanted something in the way of a stream, even if it was conducted through a little wooden conduit, to remain and remind them of their river. That was vouchsafed to us last year; ten million gallons a day were to be guaranteed to run down. A good part of that would evaporate before it reached the lower part of the town, and it would never reach the mills in any such quantity. But this year my brother began his opening to you by saying that they had reconsidered all that, and that they had decided not to guarantee any quantity to run down. Of course, at certain seasons of the year they could not very well help it. They

would not build a Chinese wall there for the mere purpose of injuring the people of Andover.

Mr. HAMMOND. — You are right in assuming that we should not go to any great expense for the mere purpose of injuring the people.

Mr. MORSE. — I should have known, from the natural kindness of my brother's heart, that he did not desire to destroy the town ; but his proposition, as I understand it, is that the city of Cambridge shall have permission to take the entire river. That is no more than we anticipated last year, for we then believed that a bill with this concession of ten million gallons a day would never be considered satisfactory by the city of Cambridge, and that, ultimately, they would get that condition removed. Therefore our argument was largely based upon the proposition that, if the right was once granted to them to take any portion of the water of the Shawsheen, it would result finally in taking the entire river, and my opposition to this bill must be based upon the assumption that the entire river will be taken. That is the proposition which the city of Cambridge now submits ; and I presume that the city of Boston will not be behind the city of Cambridge in asking for the whole river.

Mr. HAMMOND. — I do not wish to interrupt you. Perhaps I have already interrupted you too much ; but I have presumed upon your good nature and your ability to take care of yourself. But the proposition of Cambridge is not to take the whole river ; the proposition is to take only eight million gallons a day. I desire to correct you, if you think the proposition of Cambridge is to take the whole river.

Mr. MORSE. — Let me ask you if you propose to put in any clause like that of last year, guaranteeing ten million gallons a day to run down?

Mr. HAMMOND. — That is an entirely different thing. We only ask for eight million gallons a day.

Mr. MORSE. — That is only the proposition, in another form, to take the whole flow of the stream, because the flow of the stream during a large part of the year is not more than eight or ten millions of gallons a day. It is much more than that, of course, in some seasons of the year.

Mr. HAMMOND. — Do you concede that during a large part of the year it is not more than eight or ten millions of gallons a day?

Mr. MORSE. — In the dry times.

Mr. HAMMOND. — You said “ during a large part of the year.”

Mr. MORSE. — It depends upon how long you consider the dry times.

Mr. HAMMOND. — How long do you consider them?

Mr. MORSE. — I don't know ; I suppose they vary in different years.

What I understand is, that in the dryest times about eight or ten millions of gallons a day run down.

Mr. BAILEY. — You said “during a large part of the year.”

Mr. MORSE. — When I say “a large part of the year,” I wish to be understood as meaning the dry times. I suppose in the spring, and at other times in the year when the water is high, there is a very large quantity of water, very largely in excess of this amount, that runs down. I do not wish to be understood now as stating any precise figures that will control the testimony that is in. I simply desire to say, that the committee will understand that the proposition which the city of Cambridge now makes is virtually to take the whole river, because, when you eliminate from their bill the clause guaranteeing ten millions of gallons, or any number of gallons, to run down every day, you give them permission to take the whole river, if at any time eight millions of gallons shall be the whole river. Every member of the committee must understand that if one, two, three, or four millions of gallons a day should be left to run over the dam, by the time it reached a point a mile or two away from the dam a large part would have been lost by various causes. In other words, whether you take the proposition of the city of Boston or of the city of Cambridge, whether you unite them in one bill, or whether you give a separate bill to either city, you have a measure that in effect will take the entire water of this stream, and the question is, whether such a measure as that is wise and proper, and ought to be granted, having regard to the public interests. I have shown that Boston does not need it; I have shown that Cambridge is not dependent upon it, because it can get a better supply from other quarters. I now ask, if the committee should take a different view of any of these questions, whether they would still think that there is a public exigency which would justify them in depriving the people of Andover and the manufacturers of that town of their natural water supply.

I have nothing to say in regard to the general interests of the town of Andover. They will be well taken care of by their own counsel. I have only, in passing, to refer to the fact that the river is of importance to the town as an attractive feature in its natural scenery, and as essential to the health of its inhabitants. But, in behalf of the mill-owners, and especially of those whom I represent here, I want to say a single word. I know very well that it has been fashionable to say that manufacturers are not entitled to any rights as against the demands of people for a water supply for domestic purposes. Within reasonable limits that is true. If the question were, in any case, whether a manufacturing establishment should be shut up, or whether people should drink impure water or have an insufficient supply of water, we should all agree that the manufacturer should give way;

but in this particular case no such conflict necessarily arises. There is no sufficient reason why you should destroy these manufactories; yet you will destroy them as certainly as anything in the future can be predicted, if you permit either one of these cities to take this river. These establishments were built upon this river, not because the water-power is remarkable,—the water-power can be compensated for; money will pay for steam, and, to a certain extent, steam is now used in those establishments,—but because the pure water is needed for cleansing and scouring purposes. Mr. Torr, the treasurer of the Smith & Dove Manufacturing Co., a concern known all over the United States, having a large and first-class reputation, testified last year that his works required two million gallons of pure water every day for cleansing purposes.

Now, take away this river and you deprive that manufactory of the element which is essential to its business. It could not exist there without it. You shut up an important manufacturing establishment; you turn away work-people who have gathered their little possessions about them, and have lived in comparative comfort; who have been treated with a degree of attention by their employers, that, I imagine, is almost unexampled outside of Andover; and you do it in order to give an unnecessary additional water supply to this city.

Mr. McGEOUGH. — What is the nature of their business?

Mr. MORSE. — It is the manufacture of twines.

Mr. McGEOUGH. — Is that the business of all those manufactories?

Mr. MORSE. — No, sir. Capt. Bradlee makes flannels; the Smith & Dove Company, shoe threads and twines; and Mr. Stevens makes dress goods.

Mr. WELLS. — Does the establishment to which you refer need pure water?

Mr. MORSE. — Yes, sir. I refer the committee to the testimony of Mr. Torr, on page 165 of the report of last year. Near the bottom of that page, I asked him this question:—

“Q. You testified last year that you required three or four million gallons of water a day for bleaching purposes?

“A. I testified that we were using two millions a day at Frye Village.

“Q. My question was, as I have it here in the report, ‘Then you would need at least four million gallons a day at those two places for bleaching purposes alone?’ and your reply was, ‘Yes, sir.’

“A. I do not claim that we need more than two millions for bleaching purposes at Frye Village. We are not bleaching at the other village.”

In other words, the testimony, — which is given at greater length in the report of 1881, because I contented myself last year, in the

main, with referring to the testimony of 1881, — the testimony of Mr. Torr and Mr. Dove was that pure water for bleaching purposes was essential to their manufacture, and it has been already shown that in the case of Captain Bradlee's establishment it is even more important.

Mr. HAMMOND. — I understand the establishment at Frye Village to be the last manufactory on the stream in Andover.

Mr. MORSE. — I understand so.

Mr. HAMMOND. — And below the village of Andover, properly speaking.

Mr. MORSE. — Yes, sir. You have, Mr. Chairman, in evidence before you, from the testimony of last year and of the year before, the opinion of these men ; and I submit to you that the case is different from that which ordinarily arises in regard to compensation to mill-owners for the loss of water-power. That can be done by the payment of a sum in damages sufficient to supply steam-power. But here, if you take away this river, the natural water supply, you will compel these establishments to close up, and whether they can go to any other place and reopen again, I do not know. I have heard Captain Bradlee, in these hearings, say that he never would endeavor to start anywhere else again. Whether any younger men would have the courage to go into another State, or to another part of this State, and attempt to build up again these prosperous establishments, is a matter purely of conjecture ; but Andover, and that community, would lose the character and the business which it has obtained through the enterprise and public spirit of these men.

CLOSING ARGUMENT OF WILLIAM G. RUSSELL.

IN BEHALF OF J. PUTNAM BRADLEE, OF THE BALLARDVALE
WOOLLEN MILLS.

Mr. Chairman and Gentlemen :—

The petitioners, the cities of Cambridge and Boston, seek from this Commonwealth leave to divert the water, and, as far as we are instructed, the entire water, of Shawsheen river from the bed in which it runs, and to convey it into their respective cities for the use of their inhabitants.

It may be as well, before looking into the merits of the claim presented by each petitioner, to consider very briefly the nature, the effect, the operation, of the exercise of the power which those cities ask you to grant.

They, in the first place, ask you to delegate to them part of the power of eminent domain which rests in this Commonwealth, and, under that power, to take the property of private individuals and corporations, and to confer it upon their municipal corporations for the benefit of the inhabitants of their municipalities. That is an act which, under the constitution of our State, carries with it the right to the party who is deprived of his property, to have compensation for it; and, theoretically, that compensation is fully and adequately made. In fact, I think your experience will inform you that it is very inadequately made.

But, beyond that, there is a loss inflicted of a kind that cannot be, and never is, compensated; and a part of that loss, notwithstanding that it is not compensated, is a direct property loss. Let me put a single illustration. Suppose that the taking of this river annihilates the mill of Capt. Bradlee. He receives, in theory of law, full compensation for it. But take the settlement of Ballardvale, which depends wholly or mainly for its support upon the industry which Capt. Bradlee develops at that mill, what would be the effect of the annihilation of that mill upon the property valuation of that village? It would certainly diminish it one-half or upwards; and yet not one dollar of compensation is paid to any real-estate holder in that village, except Capt. Bradlee, whose property alone is taken.

There is still another element of loss, by which not only the property which is diminished in value is affected, but which affects every inhabitant of the vicinage of the Shawsheen, the whole community of

Andover, and, to some extent, the public beyond; and that is the loss which is necessarily incident to the striking out from the face of Nature of one of the health-giving and beautiful streams of the Commonwealth. Now, when I come to that, I touch upon what my brother Hammond calls "the region of sentiment." But, I submit there is a real, a substantial loss when such an act is done as is involved in striking out a stream of ten miles in length from the map of the town of Andover and its vicinity. And that loss, gentlemen, as well as the second class of property loss to which I have referred, having no provision made for compensation, is one which you are all the more, and for that reason specially, bound to keep in mind.

Now, that the need of a great city of water for domestic purposes may constitute an exigency which shall justify the Commonwealth in exercising its power to inflict this loss upon one portion of the community for the benefit of another portion of the community, I am not here to deny; but whether it is so in any given case must be determined by weighing the actual, proved necessity on the one side, against the rights of the parties whose property is to be taken, and the loss to which the rest of the public is to be subjected. I am here to-day to ask you to weigh that exigency against that loss, judicially, and not as representatives of this or that municipality which is before you.

I stand here to represent Captain Bradlee, the owner of the Ballardvale mills. He represents, as that owner, an invested capital of, I think, \$120,000, according to the tax-list. His mill employs two hundred and fifty operatives. Its annual product is \$400,000,—a peculiar product, the Ballardvale flannel, which in thirty years has acquired a name, and a name in itself of great value, an article to the manufacture of which, as he says, the pure water which he now has is essential; so that, without it, that manufacture must cease. What would be the value of his mill for other purposes, for other processes of manufacture, is a matter wholly indeterminate. Whether, for instance, in cotton manufacture, he could compete, or his successors could compete, with Lowell or Manchester, is a matter of very serious doubt.

His direct pecuniary interest, then, is large. But, assuming it to be nothing,—assuming it to be, on the theory of the law, compensated dollar for dollar, if he meets a loss,—yet I stand here, as representing Capt. Bradlee, on behalf of the community which has built itself up about these works, which has invested there its capital, and which makes there its home; and I claim that he has the right so to represent them, and I have the right, in his behalf, so to do. A village of seven hundred inhabitants, about which the fact, I will not say *proved*,

but the fact *conceded* by my brother Hammond, is, that it is a "very happy New England factory village,"—a village where, by the liberality of Capt. Bradlee, they have, without cost, their large free hall, their annual course of lectures, their adult school, their library, their bowling-alleys, their billiard-tables,—a place where the problem of labor and capital is not a disturbing element. And, further than that, Capt. Bradlee stands here to protect the vested right in freeholds held by forty of his operatives in their own right,—forty of them being shown to be owners of their own dwellings. He stands here to represent the larger community which is affected by the loss of the Shawsheen. I have not time here to stop to discuss the question of sentiment with my brother Hammond. I might say, in passing, that sentiment is, in the last analysis, about all there is worth living for, and all that is worth dying for. I propose to meet him, by and by, upon facts, figures, dollars, and cents. But I cannot help recalling that in his argument last year, which you will read both for your edification and your entertainment, I will not say he sneered at sentiment, because my brother Hammond never would sneer at a thing in a way that would be offensive; his good manners are equal to his good nature, and he possesses both in a high degree; but he did treat in a vein of pleasantry the evidence presented last year in reference to the fact that Andover would be injured by the loss of this stream; and he spoke, I think, in a vein of pleasantry of some of the witnesses she produced here. I have yet to learn, gentlemen, that Prof. Park, of Andover, one of the clearest thinkers and best writers of this community, is to be derisively spoken of as a "sentimentalist," when he claims that it is a loss to Andover that her citizens and her theological students cannot have the waters of that river to bathe in, or to boat on, or its banks for their pleasant walks. It is not a light thing to strike out a river like that from existence.

Now, taking up the case of these petitioners, each by itself, what claim does each show to have the right to inflict this loss upon another portion of the community for its own benefit?

I begin with Boston. The first question is: Is Boston here at all, and, if so, how? Her solicitor appears, although he does not happen to be present this morning; but under what authority? If you look to the proceedings of last year, as you will, you will be satisfied that Boston did not come here last year to get the water of the Shawsheen. She came here to prevent Cambridge from getting the water of the Shawsheen, and that was all. What new instructions has the City Solicitor, and from whom do they emanate? This year's city government has given him none, and he comes here, if he has any authority, under the authority of the Water Board of Boston. What

is the Water Board of Boston to-day? A body which stands just now subject to the vote of both branches of the city government, requesting the Mayor to remove it, — every member of it, I suppose, — for inefficiency.

But suppose Boston to be here, the next inquiry is, and, I submit, a proper one, and an essential one: What use has she made of the powers that have been already granted her? What are her needs, in addition to what she could acquire by the proper exercise of these powers?

I propose to treat, first her supply from the Sudbury and the Cochituate; and secondly her supply on the other side of the city, from the Mystic.

The present yield of the Sudbury and Cochituate system is shown to be forty-two million gallons daily. The present consumption of Boston, with a population of three hundred and fifty thousand, at sixty gallons per head, would be twenty-one million gallons; a clean surplus of twenty-one millions gallons left. This will suffice for double her present population, and that means for at least thirty years, if she stands as she is to-day, with no further development of her supply.

But, I submit, gentlemen, that Boston is bound to account, not only for what she has, but for the development of what she has; and it is clearly shown that she can add to her present supply fifteen million gallons more, — five million by the basin now in process of construction, Basin No. 4; five million by the Whitehall basin; and five million by the Marlboro' basin, — a supply, then, of fifty-seven million gallons, sufficient for a population of nine hundred and fifty thousand.

Now, then, I am bound to account for the limit I have fixed of fifty-seven million gallons as the product, and for sixty gallons per day as the proper consumption. How do I arrive at that? The present yield, as testified to by Mr. Crafts, and as it has been established by every estimate in the past, and by all the evidence that has ever been brought forward in reference to the Sudbury and Cochituate, is thirty million gallons per day. That has never been questioned, except by some testimony introduced here the other day by Mr. Wightman and Mr. Sawyer. On an analysis of that testimony you will find that it does not contradict the statement that the yield of that region is thirty million gallons per day, but that Boston is drawing from it only twenty million. But that is owing to the peculiar way in which she uses it, and not to the fact that the thirty million is not there, if she used it properly. Nobody pretends that the discovery has been made this year that the yield of the Sudbury region is ten million gallons (that is one-third) less than it has always been supposed to be. Now that Basin No. 4 can be added, and is to be added, nobody questions; that

the Whitehall basin can be added, nobody questions. The only question is about the Marlboro' basin. Why is the Marlboro' basin rejected? Because of its shallowness. I think there is something shallow besides the Marlboro' basin. You have the testimony of Mr. Sawyer that the average depth of that basin is fifteen feet; and the city of Boston is proposing to go to the Shawsheen and establish there a basin of eight hundred acres, the average depth of which is ten feet! Now I say that shows the flimsiness of the arguments of the city of Boston in regard to their want of capacity to develop the Sudbury, compared with their avidity in reaching for water in other directions.

Next, gentlemen, on what do I ground the proposition that sixty gallons per day per head is a sufficient limit of consumption? I might say on the concurrent testimony of every one who has testified upon the subject. That Boston's consumption can be reduced to sixty gallons per day is shown by the City Engineer's report of 1882, City Document 124: "If the consumption could be reduced to the limit therein mentioned, sixty gallons per head, the capacity of the works would for many years be largely in excess of the consumption. That the waste can be prevented is shown not only by the figures of the committee's report, but by the experiment made with the Deacon meters."

Last year, in his testimony, at page 89, Mr. Greenough says, "I think it could be done, and I think it would pay the city of Boston the expense of doing it." Mr. Wightman and Mr. Sawyer both say here, at this hearing, that it can be done in one year; that it has been done; and that it can be done again by the simple process of house-to-house inspection. We have a right to inquire, then, why it has not been done. What has been done to diminish the consumption? Absolutely nothing, gentlemen; *absolutely nothing*, except the occasional issuing of circulars like that which you had produced of last September, — one of those shrieks to which the community have become so accustomed that they pay no regard to them, and which, as Mr. Crafts says, may as well be issued at one time as another. But the city of Boston has not lifted its finger in any efficient way to stop this immense waste of consumption in the city proper, from the time it was first called to their attention to this.

Now then, I say, the city of Boston is shown, on the Sudbury and Cochituate side, to have an ample supply already, — an ample supply for a generation to come, and the capacity of developing it to a greater, and a vastly greater, extent beyond that. She needs for a generation, and more than a generation, only a new development of her old resources, and a checking of the admitted unnecessary waste.

Now let us go over to the Mystic side, and I think I may fairly say that the claim on the part of Boston is nothing but that she should be

allowed to take the Shawsheen in order to supplement or to supersede the present Mystic supply. I submit that the city of Boston shows no necessity for either supplementing or superseding the Mystic; that her supply there is shown already to be sufficient for the present, and the capacity for developing it to be sufficient for a much longer period.

The present supply derived from the Mystic may be set down at eight million gallons per day; the consumption in that quarter seven million gallons per day. The capacity of the Mystic developed is fifteen million gallons. For that I refer to the City Document of 1874, No. 85, page 65, and to Mr. Crafts' testimony, which is based upon it. Now why should not the city of Boston develop the Mystic supply? I admit that, for a period of time, there was good reason why she should hesitate to do it. There was, more than that, good reason why she should think that she might have to abandon it. But that period has passed, and the danger that she would have to abandon it, and the objection to her developing it, have passed also. The city of Boston, by the system of drainage that she has adopted in the Mystic valley, has protected her present supply. It is efficacious. At first, she drained into the lower Mystic pond, and created a nuisance there, which, under the process of the courts, she was obliged to remove. She has found, as "necessity is the mother of invention," a way of purifying that sewage; and she is practising it, and practising it successfully. To what extent has she removed the contamination and pollution of the Mystic river at the present time? To such an extent, gentlemen, that it is to-day "the purest water that is brought into the city of Boston." And I am simply quoting from Mr. Bailey, a resident of Charlestown, who uses it daily. I cite from the Report of 1882, page 189. I will give you more fully what Mr. Bailey says upon the subject. He says: "Then we built the Mystic sewer, by which we are able to take care of the sewage which polluted that water, and we have put it into the condition in which it is to-day, — the purest water that comes into Boston. But, having done that, the danger stares us in the face to-day of being compelled to give up that sewer, in which event the sewage will go back into the river, and we shall be compelled, of course, to abandon it." But there is no prospect of that at present. That was last year. Their contrivance for the purification of the sewage works, and works well, and that danger is averted.

The introduction of the metropolitan system of sewerage, which is in contemplation, would amply prevent it. What said Mr. Greenough on that subject? "We would be content to stand still for a little while, till we can see how the metropolitan system is coming out down there in the Mystic valley. If we can drain the valley properly, I think the Mystic system, or at least a portion of it, can very

properly be maintained." Again, last year, Mr. Bailey said: "I say now, if we cannot have the right to protect our Mystic supply, we have got to give it up, and then we shall want the Shawsheen. If we can have the right to protect our Mystic supply, we do not want the Shawsheen at present. Our position has been that from the beginning." And it ought to be that, gentlemen, to the end; and I trust that this Legislature will see to it that that is their position to the end. Boston cannot have the Shawsheen until it is apparent that she cannot protect her Mystic supply. The Shawsheen will continue to run until that time comes; and that time will not come so long as the Mystic is "the purest water that comes into the city of Boston."

In addition to the testimony of Mr. Bailey we have that of Mr. Sawyer, the water commissioner, and Mr. Doane, our engineer, both citizens of Charlestown, who say that the water is purer than any other water, and that the city of Charlestown would object to using the Sudbury. Again, the City Engineer's report for 1882 (City Doc. No. 124) says: "The Mystic water has been unusually good the past year. The *algæ*, which have in former years rendered it at times objectionable, did not appear to any extent. The removal by the Mystic-valley sewer of the sewage from the tanneries, which formerly polluted this source, has been the most important factor in the improvement of the quality of the water."

Now, as to extending the Mystic system to its capacity of fifteen million gallons, what is the objection to that? There is no question as to the two smaller upper basins, which have a capacity of one hundred and fifty acres and of five million gallons. Mr. Sawyer says they can be well constructed. There is one large basin, No. 6, that is contemplated on the Mystic, and to that he does state the objections. What are they? First, the cost (\$109,000) of erecting a dike; second, the shallowness of Basin No. 6 when it is constructed. Are these sufficient reasons, gentlemen, for not developing a basin which will give a storage of ten hundred and forty-two million gallons? Ten hundred and forty-two million gallons, at a cost of \$109,000 for building a dike! It is less than one-quarter of the cost of cleaning out their basin on the Shawsheen. Well, then, as to shallow flowage, let us test that a little. He says there will be fifty-five acres of flowage of less than five feet depth in that basin, if it is constructed. I think there will be. Has he ever figured the acreage that there will be at the Shawsheen less than five feet deep? If he has, he has found that the Shawsheen basin will give him two hundred acres less than five feet in depth. Put it in another way. The three hundred and twenty-three acres give him ten hundred and forty-two million gallons of storage; that is, three and a half millions to the acre. Up at the Shawsheen he has eight hundred acres, and gets two thousand millions of storage, which

is two and a half millions to the acre. The Richardson basin is a better basin than the Shawsheen will be. What excuse does the character of that basin afford for not developing the Mystic?

Boston, then, needs nothing for the Mystic supply. She has an ample supply for the present. She has capacity for developing fifteen million, in addition to the eight million she has.

As to the danger of future contamination by the increasing density of population in the Mystic valley, while we admit that such danger is fairly to be considered in determining the selection of a new source of water supply, we claim that it is not entitled to equal weight in determining the question of abandoning one already selected and in actual use, with a system of works already constructed at great expense, and in successful operation. In such a case the question becomes one of the expense and the feasibility of protection. We can properly claim that the legislation already in force is sufficient to protect from further pollution the streams which Boston uses for her water supply; if not, that it will be made sufficient. Boston has already found means, by amending the drainage of the valley, as it is now occupied, to purify successfully the stream and basins as now used. There is no reason to suppose that she cannot find like means to protect the basins to be constructed for a larger supply.

Moreover, if Boston does need a supplementary supply for the Mystic system she can evidently have it under the Act of 1880, which authorizes her to connect the Sudbury system with the Mystic; and she can carry over there, at an expense of \$400,000, any amount from her present and prospective surplus on the Sudbury.

I submit, then, that Boston has no standing here. She shows no present need, no need for the distant future. The cry of —

“ Water, water, everywhere,
Nor any drop to drink,”

at present arises from her own improvidence in not developing, in the faulty construction of her present system, and in the wanton allowance of unchecked waste.

Mr. Greenough, of her water committee, put last year, very properly, the ground on which, and on which alone, Boston would be entitled to come to the Legislature for an additional grant. Let me cite it from page 99 of last year's report: “ Of course the Charles still remains for us to apply for. If we should come in here fifteen years from now, *and show that we were saving our water in Boston, and spending it economically*, I suppose the Legislature would allow us to spend a million dollars for the Charles.” I think, gentlemen, you will hold the city of Boston to that. If they come here and show that they are saving their water,

and spending it economically, and are still in need, they will have some showing, and not until then.

And this leads to the obvious suggestion, gentlemen, that Boston should not be allowed to take further from small sources of supply where she can pick up a little here and a little there to the detriment of the neighboring towns; but that her next taking should be for a long time, and for all time. The next large supply which she could take would be the Charles. And you have it in evidence that, in constructing her conduit from the Cochituate system to the Chestnut-Hill reservoir, she built it of the capacity of one hundred and ten million gallons, which is eighty million more than she is now using, and that she did it in contemplation of taking the water of the Charles, and introducing it into that conduit. Again, I think the suggestion which was made of the Merrimack as the ultimate source of supply, is one well worthy of the consideration of the city of Boston, of this committee, and of the Legislature as exercising a guardianship over the future action of the city of Boston. The Merrimack, with its flow of one thousand million gallons per day, where the taking would be imperceptible, except as affecting mill-power, is an inexhaustible supply, as Mr. Wightman has said. What was his objection to it? The muddiness of the water. The answer at once was, "How about Lawrence and Lowell? They drink it, do they not, and they find it good water?" — "Yes, but Lowell filters it." A gentlemen present suggested that Lowell did not filter more than one-third of the water she used. That led to my putting the inquiry to a gentleman whose competency no one will question, Mr. Francis, of Lowell; and I have received from him a statement in relation to the filtering-gallery of the Lowell water works. He says: "I send you by this mail some reports of the Water Board that contain data as to its yield of water. By the report for 1878, page 7, its yield is somewhat less than nine hundred and fifty thousand gallons daily. By the report of 1882, page 37, the daily average of water pumped was two million five hundred and twenty-one thousand six hundred and four gallons. That is, only about three-eighths was filtered." But, gentlemen, that is a question for a future generation, and not for you, to act upon. Mr. Crafts' tables show you that the present supply is already sufficient, if properly developed, for one million two hundred and fifty thousand people in the district of Boston, including the Sudbury, Cochituate, and Mystic.

Now, gentlemen, we come to the city of Cambridge and her claim. And, at the outset, the city of Cambridge comes here in what, in a judicial tribunal, would be held to be contempt of court. The action of the last Legislature was, if not a direct requirement, in its mildest form, a recommendation for her to apply to Boston, to see on what

terms she could obtain her supply of water from that city. Has she, in good faith, complied with the recommendation? I will substitute for the words "good faith," *due diligence*, to please my brother Hammond.

That legislative action was certainly as early as the first of June last. What did Cambridge do about it? The first action she took was on the 29th of September, — four months of dead inactivity, to begin with; then there was a recommendation from the Water Board, I think, to the City Council, that something should be done. The first thing that was done was more than a month after that, when the Mayor sent a letter to Mayor Green of Boston, — that being the first of November; and at some time between that and the first of December, seeing him upon another matter, they arranged for a meeting, which, by a happy accident, was to take place on the day of the municipal election in the city of Cambridge. So that meeting fell through. What next? January 17th, gentlemen, after the new government of the city of Boston was organized, they, on their own motion, send a notice to the city of Cambridge, that among the unfinished business on their files is this matter of the application of the city of Cambridge for water.

MR. HAMMOND. — You remember that that was after the two Mayors had met.

MR. RUSSELL. — The Mayors had met before that; yes, sir.

MR. HAMMOND. — So that our Mayor spoke to your Mayor about it.

MR. RUSSELL. — It is true that, before the 17th of January, the Mayor of Cambridge had spoken to the Mayor of Boston; and what came out of that was, that about two weeks ago, as Mayor Fox says, when testifying, "Having two matters in hand with Mayor Palmer, I saw him, and suggested that we should have a conference some day." Well, Mayor Fox was testifying somewhere about the 20th of February, and that conference had not been had then, and, as far as we know, it has not been had now. Now, I do not believe that that is the way in which Mayor Fox and the city of Cambridge conduct their affairs, when they are in earnest. It is very plain that the theory of Mayor Fox, and of the officials at the City Hall of Cambridge, to a man, is that the Shawsheen is the only source of supply; at all events, that Cambridge had better have an independent supply. The Legislature of last year happened to entertain a different opinion upon that question, and they signified it to Cambridge; but it has not had much effect in disturbing the prejudices or the opinions of Cambridge City Hall upon the question. It remains to be seen what you, gentlemen, and what the Legislature will say upon that question this year.

I think, gentlemen, it is apparent that, if it were possible, it would

be the best policy that there should be one large source of inexhaustible supply obtained for the metropolitan district, including all the suburban towns, as well those which may become, as those which have become, part of the city of Boston. If Cambridge is to be annexed, who would question that her water system ought to be the water system of Boston? Mayor Fox says that annexation is no longer discussed. And why? "Because the metropolitan police system, the metropolitan drainage system, etc., render annexation unnecessary." If he were to fill out that "*etc.*," the only thing I think of that he could put in would be "the metropolitan water system"; and that would be a very proper filling of the gap.

Now, what are the wants of Cambridge, and what are her means of supply? We admit that her wants are pressing, and that she needs, at the present time, a million or a million and a half gallons of water per day, and that in the future she will need four million or five million. Her proposition is to construct at once works which would give her a supply of twenty million, out of which she will use eight million, and our criticism upon it is, that the outlay for years to come — for ten or twenty years to come — will be an enormous loss of interest over and above the expenditure required, if she can get only what she wants and pay reasonably for what she gets. We undertake to show two methods in which she can do this; and we ask the legislature, in the exercise of its guardian power over that city, to say to her that if she can procure an equally good and abundant supply for all her wants at a much less cost than she proposes, she shall adopt one of the two methods by which she can make that saving.

I submit, there is no reason to suppose that this could not be done by her deriving her water at a reasonable rate from the city of Boston. We have already shown that Boston has an abundant supply for the present and for the future. If Boston is correct in her claim that she needs to reinforce the Mystic supply, and has got to do it by the most available and reasonable method, carrying the Sudbury over to the Mystic, she passes through Cambridge, and can just as well draw at Cambridge the two, three, or five million of gallons per day that Cambridge needs, or may need, as not to draw it. The evidence last year was abundant that Boston could supply water to Cambridge. Mr. Greenough, on p. 96, Mr. Bailey, on p. 97, are very full on that point.

The first objection made is the cost. Can Cambridge raise that objection? She has done nothing to ascertain what the cost would be. She has not made an inquiry tending to ascertain it; she comes here, as I have before said, in utter disregard of the recommendation that she should make that inquiry. The only data which we have to go upon here are those derived from Mr. Crafts' estimate of what is the

cost to the city of Boston of obtaining and conveying her water and delivering at the Chestnut-Hill reservoir. I will refer you, gentlemen, to his tables, which will be printed and laid before you, in which he shows by computation that in ten years Cambridge, assuming her increase to be what he reckons it will be, will need, in addition to her own present supply, three thousand eight hundred and ninety-nine millions of gallons of water for the whole term of ten years; that if she procures it from the Shawsheen, upon the estimated cost of the construction of the Shawsheen works, she will have paid \$540,000 for it; which means simply the interest, at five per cent., not compounded, of a million dollars, and \$4,000 a year for cost of maintenance. If she takes it from the second source of supply, which we propose and suggest, the Stony-brook supply, it will have cost her \$265,000, reckoned in the same manner. If she takes it from Boston, and pays \$50 per million gallons, which is evidently the highest price that any one would dream of, it would cost \$195,000. The saving, therefore, by that method over the taking of the Shawsheen, in ten years, would be \$345,000, — nearly enough to pay for the Stony-brook system constructed.

Now, what reason is there, other than this matter of cost, why Cambridge should not take her water from Boston? Is there any objection on the score of quality? I think Mayor Fox showed a good, sound common-sense when he said that he believed that Boston would have good water; and I believe it, too. Mistakes have been made; they have been now pretty well exposed, and the next thing is to have them remedied. But, according to the plan presented by Cambridge, she proposes, under the guidance of Mr. Barbour, to plunge headlong into the same mistake that the city of Boston has already made. If she is saved from it it will be by the developments made at this hearing. If she follows Mr. Barbour's guidance, then, in about five years from now, when her works have been completed, her eight-hundred-acre basin will be sending down into the city its decoction of vegetable decay and of *algæ*, to the disgust of her citizens; and she will begin, as Boston is doing now, to drink spring-water. Her basin of eight hundred acres averages ten feet in depth. Assuming it to be, as the simplest proposition (and certainly it is one favorable to her), — assuming that basin to be a perfect wedge, tapering to nothing at the deepest point, there will be a section of water which will be ten feet deep half way from the centre of the pond to the shore. Dividing that section again nearest the shore into two, you will have a section five feet in depth at its deepest point, and tapering to nothing, and that section will contain two hundred acres. Two hundred acres of shallow flowage around the margin of that basin, less than five feet deep! That is the plan which Mr. Barbour proposes, and which he propose

to execute without excavating the loam or the mud which forms the bottom of that basin!

If, on the other hand, Cambridge relies on Boston, what will be the case? The present system of Boston, by that time, upon the predictions of the wise men, will probably have purified itself. Basin No. 4, you may be sure, will not be constructed with the loam left in; and its depth, I think, is stated to be forty-five feet. The Boston supply, then, will be a supply of pure water, of which Cambridge, if she takes it, will have the benefit.

Now, what is to be the cost to Cambridge of the plan which she proposes? Mr. Barbour's estimate originally was \$600,000. He raised it last year, I think, to \$700,000, and he put it at \$700,000 this year, — \$700,000 for the whole construction. You remember, gentlemen, the somewhat painful scene where Mr. Barbour undertook to satisfy this committee that, in that estimate, he had included \$100,000 for clearing out the basin of the Shawsheen river. I do not wish to be harsh in my judgment of Mr. Barbour, and I do not ask a harsh judgment of him from you, and I am willing to make all the allowance for the condition of his health, and to wish him a speedy recovery; but it finally became plain that his estimate last year and this year for clearing that basin was \$40,000, and no more, and, including that item, his estimate of the entire cost of the work this year is \$700,000. We show, by the evidence of the City Engineer and of our own engineers, whose competency cannot be questioned, that the mere expense of clearing that basin, instead of \$40,000, would be \$500,000; — \$600 to \$800 per acre is the estimate that all the experts combined have agreed upon.

Now, as to the necessity of that clearing. That, gentlemen, is a matter that has been developed pretty much since the last hearing before this committee in the year 1882. There has been a thorough investigation before the "Commissioners to investigate the water supply of Boston," which terminated only last month, their report having been made Feb. 15, 1883 (City Document of 1883, No. 129). On page 3 of their report, the summing up of the whole matter is put in these words: "The fact is now unquestionable, in the judgment of the Commission, that the only way to properly construct a basin is to take the loam all out."

In the report of the hearing of 1882, Dr. Walcott, called by the city of Cambridge, says: "I think it would be the height of folly to use the natural surface of the ground for a basin. That has been shown in every town of the Commonwealth where the experiment has been tried."

We may take it now as a settled fact, that the loam and mud must be removed from every basin constructed for water supply in this

Commonwealth, and to do that involves, on the part of Cambridge, on the Shawsheen plan, an expenditure of about \$500,000. The whole expense, therefore, of that construction is brought up from \$600,000, at which it was originally estimated, to about \$1,100,000, — upwards of \$1,100,000, without reckoning anything for the mill damages.

But, even at the lower estimate, the recommendation of every scientific man who has dealt with the question is, that Cambridge should come to Boston for her supply rather than take the Shawsheen. It was the recommendation of Mr. Chesbrough, in 1872; it is the recommendation to-day of Mr. Crafts and of Mr. Doane.

I do not know that I shall be called upon to discuss the right of Boston to sell, or the right of Cambridge to buy, this water. Mr. Hammond, do you make that point or not?

MR. HAMMOND. — Well, I make the point that, in order for Boston to supply Cambridge, additional legislation would be required. That is, I do not say that I make that point; I am placed here in a peculiar position in reference to that matter, because we may go to Boston; but I say that we may be met by a question which cannot be settled except by the courts. I have no doubt Boston would make that objection.

MR. RUSSELL. — Well, upon that I have a very few words to say.

Judge WELLS, of the committee. — I wish Mr. Russell would state his views upon that.

MR. RUSSELL. — I will do so with pleasure. I say, in the first place, that Boston has taken, and owns to-day, the whole of the water of the Sudbury river, except one million five hundred thousand gallons per day which is to be allowed to run in its channel. The Act of 1872, Ch. 177, authorized the taking of all the water, and it was vigorously contended by the mill-owners that it authorized the taking of nothing less than all. They insisted that their rights were fixed, and, if I am not mistaken, before the Act was passed, they insisted that they should be fixed, by the absolute requirement that the city should take all the water except a million and a half gallons.

At all events the Act authorized the taking, whether it required it or not, and by a paper taking, made and recorded by the city, as required under the Act, the city took all the water of the Sudbury river, except a million and a half gallons per day; and by the award of the Commissioners damages were given on the theory that they had so taken all the water. So that they have not only taken it all, but they have paid for it all. The case of *Bailey vs. Woburn*, in 126 Mass., simply decides that a city which is authorized to take water for the use of its inhabitants has no right to take water to sell to other municipalities. The court declined to pass upon the question whether they had a right to sell water which they had taken. Boston, on the other

hand, was to take all, and did take all. In the Act of 1872 power was distinctly given to Boston to sell water to various towns that were named. Cambridge was not one of them, because Cambridge was not upon the route of her works; but, by the Act of 1880, Boston is distinctly empowered to sell water to the city of Cambridge, in case she constructs her conduit from Chestnut-Hill reservoir to the Mystic system. That legislation shows that the Legislature have no doubt of the right of Boston to sell, as the owner of the water; and if, as my brother suggests, further legislation is needed, further legislation can easily be had to settle that question. Authority can be granted to Boston to sell in any other manner, just as well as it could be granted to her to sell from her conduit in case she should build it to connect the two systems.

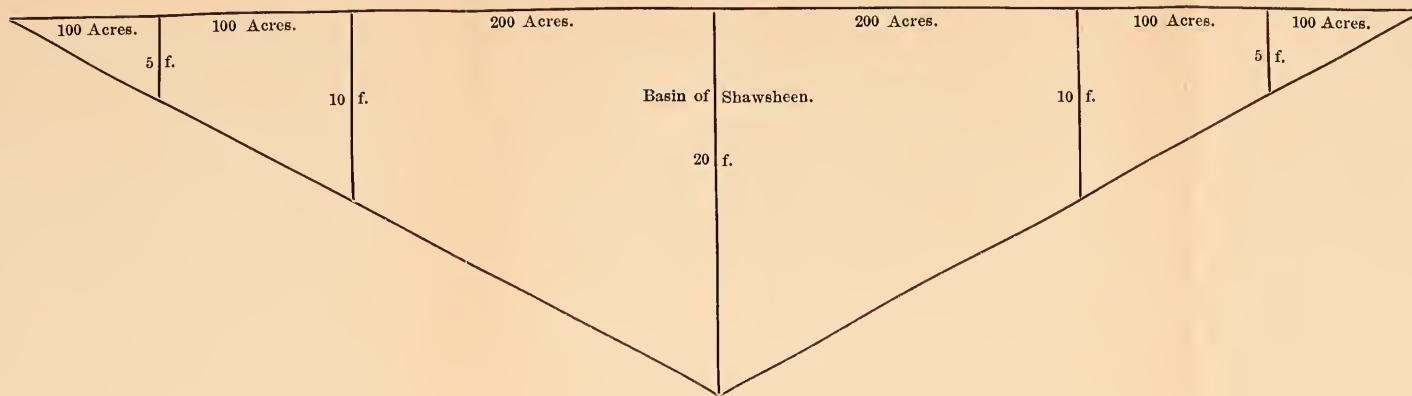
Now, gentlemen, I wish to discuss very briefly the alternative plan which we have ventured to recommend to Cambridge, if she must have her independent supply, and cannot bargain with the city of Boston.

Cambridge came here last year wringing her dry hands, and asking, "Show us some water somewhere." And Captain Bradlee answered to the appeal, and set his engineers at work to see if he could supply that crying want of Cambridge, and he believes that he has done it in suggesting and bringing before them, in the pamphlet which has been laid before you, a scheme for developing and introducing to Cambridge the water of the Stony-brook basin. "Necessity is the mother of invention," and self-defence, I think, stands here as the mother of discovery. Cambridge will have reason to thank Captain Bradlee, as Andover has already done, by a formal vote of thanks in her town-meeting assembled.

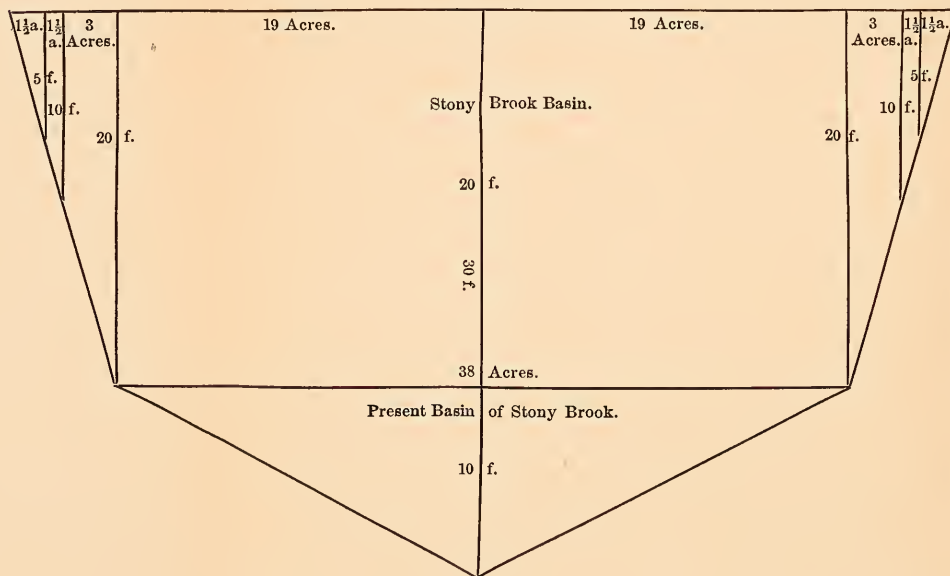
What is the evidence as to this project which we recommend to the city of Cambridge? It bears the sanction of the authority (I think it will be admitted by my learned friend, the best that could be procured within this Commonwealth) of Mr. Crafts, formerly the city engineer of the city of Boston, supplemented by that of Mr. Doane, who stands high in his profession, and of Mr. Forbes, the younger partner of Mr. Crafts, all of whom speak from personal knowledge and investigation. They tell you that, upon an examination of the Stony-brook basin, they find it has all the requisites of a water supply as to quantity, quality, and economy, in a wonderful degree.

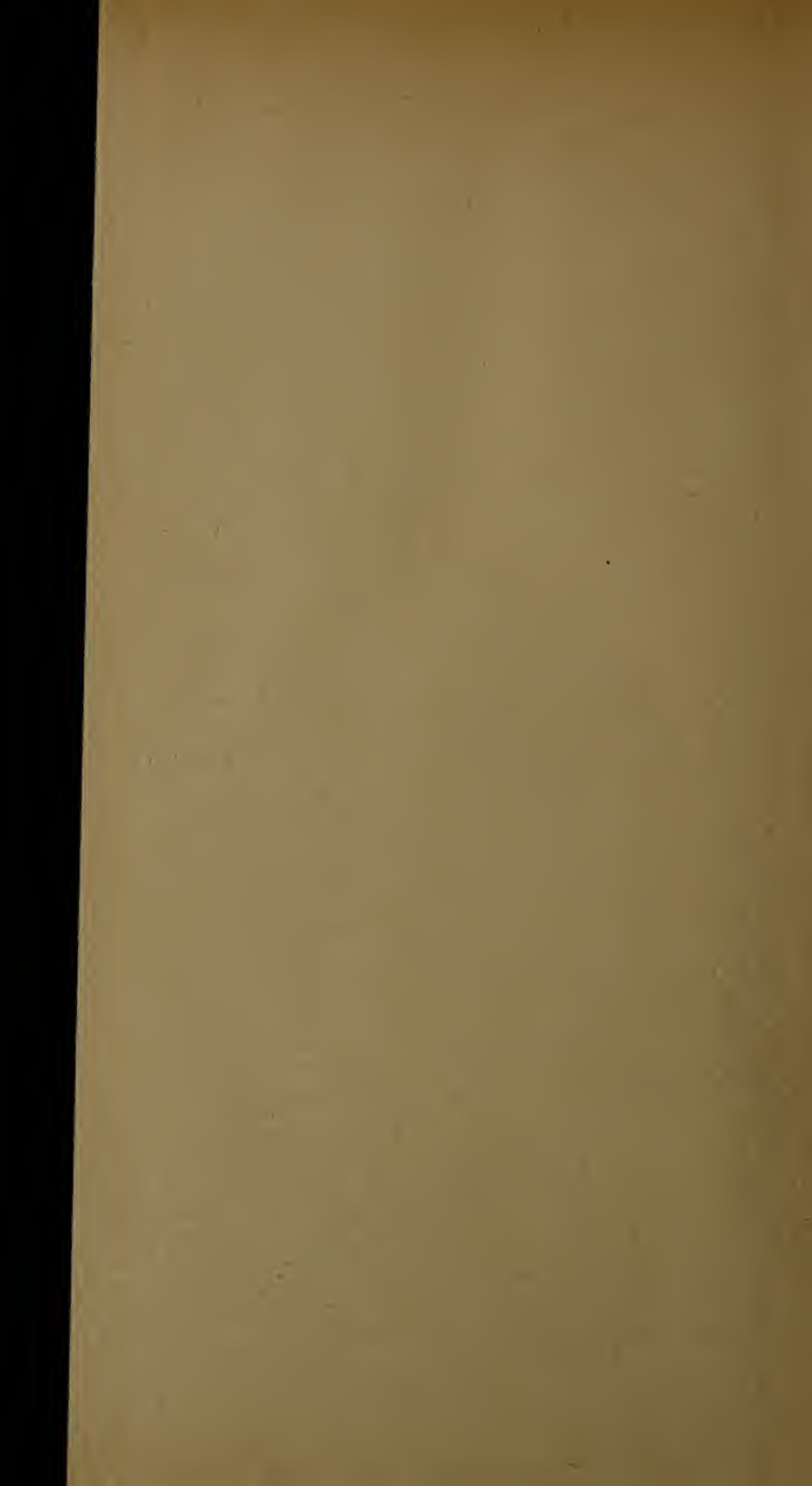
First, as to quantity. They have estimated that, as they tell you, in the usual, in fact, the only way, in which the yield of a given water-shed has been estimated before the works were constructed. There was some question, apparently, in the mind of my brother Hammond as to the thoroughness with which that had been done. The answer to that is, that it was done in precisely the same manner in

800 Acres.



50 Acres.





which the Shawsheen has been estimated,—in precisely the same manner in which the Mystic was estimated before the works were constructed, and the Sudbury also. There can be no doubt, in the mind of any one, that the yield of that water basin is seven million gallons daily.

The quality is the next point. Dr. Wood, whose analysis of four specimens is given in full, says in his note of Oct. 24, 1882: “The water of Stony brook contained a little more vegetable matter than the Shawsheen did at the time I made the examination in 1873 or 1874; but that time was after a long dry season, so that I am inclined to think the water is at the present time equally good.”

Nothing further need be said as to present quality; but, gentlemen, I am prepared to maintain that the water of Stony-brook valley, if it is now equally good, or if it now approaches the present standard of the Shawsheen, will be better than the Shawsheen when it is used, because of the peculiar characteristics of the basin from which that water is to be drawn. Recent investigation shows that the great evil affecting the present water supply arises from shallow basins; we claim to show here a basin of shape and dimensions superior in that respect to any that is shown to exist in use in any water supply that is known in this vicinity.

What depth has the Shawsheen basin as designed? As I have already shown you, an average of ten feet; one-quarter of its area of eight hundred acres less than five feet deep. What is the basin of the Stony-brook supply? It starts with an old pond, which has cleared itself perhaps for a century, but, at all events, is practically clean, and is somewhere from ten to eleven feet in depth, and of thirty-eight acres in area. Upon the top of that surface of thirty-eight acres, Mr. Crafts says, you can raise a body of water twenty feet high; and how much additional area do you flow? Only ten to twelve acres; so steep are the sides of that basin. Now, gentlemen, how much shallow flowage have you on that basin, with a depth of thirty feet in the middle, and an area, when the whole reservoir is completed, of only fifty acres? You will find that there are but three acres of flowage, which is less than five feet deep. Take the margin of that old basin, and you add to it only twelve acres by flowing it twenty feet. You have got, then, only the slight proportion that twelve is to thirty-eight, added to the area of the pond. Take a transverse vertical section of it, and give that twelve acres its due proportion to the thirty-eight, and then divide it by vertical lines, so that you will separate that which is twenty feet, that which is ten feet, and that which is five feet, you have only one-quarter part of that additional area of twelve acres less than five feet in depth. I have here just hastily illustrated this by these little diagrams.

Now, gentlemen, as I have said, these do not actually represent the basins of either system; but, mathematically, they represent the basins; and when you say that the Shawsheen basin has an average of ten feet, tapering not only from the centre to the sides, but from the dam to the head of the pond, the shape of a wedge, as I give it, is sufficiently favorable as to the amount of shallow flowage. That is a reduction to a mathematical form, and a proper one. The testimony is that the Shawsheen basin will average ten feet in depth and no more, while ours will average more than twenty feet.

There is another way of testing this point. We have fifty acres of flowage, and we have three hundred millions of gallons of water stored; that gives us six millions of gallons to the acre. And take the Shawsheen basin: you have eight hundred acres and two thousand millions of gallons, which gives two million five hundred thousand gallons to the acre. That is another way of testing it.

Then, for *economy*. As I have dealt with *quantity* and *quality*, you come to this, — that the Shawsheen system cannot be constructed for less than \$1,100,000, without estimating mill-damages, while the Stony-brook system can be constructed for \$385,000, or I will call it, in round numbers, \$400,000. I submit that, in the wise exercise of the power of guardianship which the Legislature holds over the municipalities within its borders, you will not justify an expenditure of a million and upwards, when all the result that Cambridge asks to obtain can be obtained at less than half that sum.

Now, Mr. Hammond, is there any claim that there is an objection to taking this water on the ground that Waltham has a right in Stony brook?

MR. HAMMOND. — No, I do not think there is. I do not make that claim; Mr. Russell. I suppose Waltham has exercised her right. I don't know anything about it.

MR. RUSSELL. — Then I will not deal with that.

Now, gentlemen, one further suggestion, and that is, that by the taking of this Stony-brook basin, you avoid that which I have called the uncompensated loss to everybody.

MR. ———. — Are there not mill-damages on Stony brook?

MR. RUSSELL. — The mill-damages have been estimated. Mr. Crafts has made an estimate of them, and puts them lower than they would be on the Shawsheen. He gives us his testimony and estimate based upon the award that was made of damages upon Charles river, for there is where the mill-damages will arise. His plan proposes the taking of the mill-privilege at the point at which he constructs his dam, and his estimates include the cost of that taking; and he estimates, in addition to that, the mill-damages which would accrue upon Charles river to the manufacturers below where this Stony brook

comes into the Charles ; which estimate, as the committee will remember, he based upon the award which was made of mill-damages for the taking of water by the town of Waltham. I find the report by the stenographer of the computation is somewhat mixed and unintelligible ; but I think the committee will know the general plan upon which he estimated.

Mr. KINGSLEY. — His estimate was \$69,000.

Mr. RUSSELL. — It is perhaps sufficient to say, as suggested by Mr. Kingsley, that the amount he estimated for the whole damage on the Charles river was \$69,000.

Now, gentlemen, I was about to say that by the taking of the Stony brook no injury is done, so far as I know, to any part of the community that is not a subject of compensation. The difference is this, that if you strike the Shawsheen at the place where the Cambridge and Boston dam would be constructed, you cut off the stream from that point down to its entrance into the Merrimack ; you annihilate the Shawsheen for that distance, a distance of ten or twelve miles, including its whole course through the town of Andover. Mr. Crafts, by his plan, makes his reservoir very near the point where the stream empties into the Charles. There is no stream cut off, except from the Charles river. There is no intervening territory which is deprived of its former rights and privileges. I deem that, gentlemen, a not unimportant element in this case, because, as I have said to you, the power which you exercise of taking property, or of diminishing the value of property without making compensation, is a much higher exercise of power than that which is ordinarily exercised where you take by right of eminent domain, and make compensation.

Now, gentlemen, I have finished my task, I hope without consuming too much of your valuable time. I touch once more, for the express benefit of my brother Hammond, the sentimental ground, to say that if Mr. Bradlee, by the enterprise and energy which he has put into this case, and the development of this plan for the city of Cambridge, shall save the Shawsheen to Andover, and save Cambridge from the Shawsheen, the only question will be, which municipality shall erect a statue in his honor during his lifetime.

CLOSING ARGUMENT OF EDWARD P. BROWN,

IN BEHALF OF THE TOWN OF ANDOVER.

Mr. Chairman and Gentlemen:—

This controversy in regard to the waters of the Shawsheen river has been going on for a series of years. I recollect that in the Legislature of 1881 it occupied quite a conspicuous place, also in the Legislature of 1882, and the same parties, substantially, who were before those two Legislatures are here again this year. We have, in the first place, the town of Andover, we have the city of Cambridge, and the city of Boston. The claim of the city of Boston I do not believe this committee are going to consider seriously. I do not believe the committee will spend any time upon that; for I do not believe that the city of Boston, in view of the management of its water supply, can make any claim for any further or other supply until it has exhausted its present resources. The city of Cambridge is undoubtedly in need of water. I thought so last year. Her case was very ably presented to the Legislature last year, and they failed to secure what they desired simply and solely, as I understand it, from the fact that the Legislature was satisfied that it was better for the city of Cambridge to go to the city of Boston, and have an arrangement made between those two corporations by which the city of Cambridge should be supplied with water, than it was for the city of Cambridge to launch out into a great expense which was then even more uncertain and less understood than it is to-day. That was the judgment, according to my best recollection, of the Legislature of last year, — that it was better for the city of Cambridge to make an arrangement with the city of Boston than to undertake to take the waters of the Shawsheen river.

Now, something has been said by my brother Hammond in regard to the order of this discussion. I do not intend to take but a very little of the time of this committee. I cannot well see nor understand, after the very able presentation which has been made by Mr. Russell, how it is possible for the city of Boston or the city of Cambridge to have any serious claim upon this committee, and the remarkable perseverance which my brother Hammond has exhibited through two days, in trying to get the right or the privilege of saying the last word in this discussion, has satisfied me at least that the remarks which he intends to make he does not intend shall be criticised by anybody else.

Now, I ask the attention of the committee for a few moments to the position of the town of Andover. Commencing with the year 1878, and in each year since, some action has been taken by that

corporation in regard to a water supply. You have had detailed to you the number of inhabitants, the topography of the town, the location of its houses and principal streets and places of business; you have been informed, by authority which is not at all in controversy, that the condition of things in Andover, not only with reference to pure water for drinking purposes, but with reference to a supply of water for the extinguishment of fires, is such that it seriously affects the question of the rate of insurance; and if any municipal corporation ever came before this Legislature, — and a great many have during the last twenty years, — and ever made out a claim upon the Legislature for the right to take a supply of water, it certainly has been made out by the town of Andover, and if it were not for the fact that the city of Cambridge and the city of Boston are here asking for that same water supply, there would scarcely have been the need of an hour's hearing before this committee. I fancy that all the time which would have been occupied before this committee would have been simply the time necessary to examine the bill, to see whether it was proper in form, and whether the rights of all parties had been secured.

Now, as to the town of Andover, there is no objection whatsoever, as I understand it, except that which comes from the city of Boston or the city of Cambridge. The owners of the water-power property upon the river do not make objection. There can be no claim that the town of Andover has not fully considered this subject. She is paying a tax of about \$5.60 on a thousand, as I recollect. There can be no question that the town of Andover, through the proper authority, has made ample investigation, and understands perfectly well what this is going to cost; and, if I understand correctly, there has been no criticism made upon the estimates of the engineers who have surveyed this property in behalf of the town of Andover, and they have here submitted their statement. There has been no criticism made that the town of Andover, by issuing its water bonds, as provided in this bill, and by taxation for the purpose of paying interest, etc., is not amply able, and will not be always able in future, to pay the debt which shall be created for this purpose; and there is no question whatsoever that the purpose is a beneficial one, that it will add value to the property in the town of Andover, be a great improvement to the public health of the town, and assist in beautifying that already most beautiful spot in the Commonwealth. In fact, there is no objection, as I have said before, except the objection that comes from the city of Cambridge and the city of Boston.

Now, I consider the city of Boston entirely out of this case, and I have something more than my general judgment, derived from the evidence which I have heard and read in connection with this hearing. I know something about the management of the water supply of the

city of Boston. I know that it [is so poorly managed that an invalid in my house has not been able to drink it for the last six months, it having been condemned by the physician. I know that is the condition all through this city, and no person can read the testimony of Professor Wood as to the causes without coming to the conclusion that the city of Boston, in its management of its water supply, is solely and entirely to blame, and nothing else, — no other cause, — simply negligence or inefficiency. The amount is vast, — greater by three times, as has been shown by the very able argument of Mr. Russell, than her present necessities, — enough, ordinarily, every day to supply a population of nine hundred thousand, when we only have about three hundred and sixty-two thousand. So I say that the city of Boston and its claims upon your attention drop out of this case entirely.

Now, let us come to the city of Cambridge. The population of the two cities of Boston and Cambridge, taking the report of the last census, and adding to that what my brother Hammond claims has been the increase since 1880, amounts to about four hundred and seventeen thousand people. On the statement which has been shown to this committee, and not in dispute, the water supply of the city of Boston to-day is sufficient to supply nine hundred thousand people. The population of the two cities of Boston and Cambridge is not fifty per cent. of the number which, upon the figures of my friend Mr. Russell, the city of Boston is now able to supply with water. Now, that is only upon the theory that the city of Boston and the city of Cambridge can make an arrangement by which the city of Cambridge can be supplied with water. I do not intend to criticise what has been done by the city of Cambridge and the city of Boston in this respect, but I do not see any of that vigor in the management of this negotiation which I saw last winter in the Legislature, when the city of Cambridge wanted an additional horse-railroad, either on the part of her people, her legislators, or her city government. One cannot look at the correspondence which has taken place between the city of Cambridge and the city of Boston, as submitted by the testimony of Mayor Fox, without coming to the conclusion that this is a question which, in their judgment at least, is not of any more consequence than the ordinary question which has been agitated every year for the last twenty years in legislative committees, — of devising some new appliance for the Cambridge-street draw over Charles river. I say one cannot think in looking at that correspondence and listening to the testimony, that the people or the government of Cambridge have attached any more significance to it than they would to the matter of a new appliance for that draw; and yet they were given to understand last winter, just as distinctly as it was possible for a legislative body to make a communication, that that was the thing to be done, and the thing to be done was not to go and get the waters of the Shawsheen river.

I need not elaborate this point of the case, which has been so ably discussed by Mr. Russell, but I want to make one suggestion in regard to this map. I understand there is, in substance, no reply from the city of Cambridge to this report, entitled "Report on an additional water supply for the city of Cambridge," made by Messrs. Crafts, Doane, and Forbes.

I cannot understand, Mr. Chairman and gentlemen, how any person looking at that survey, assuming that it is correct (and I believe it is not criticised), can hesitate for one moment to say that the Stony-brook supply is much better for the city of Cambridge than the Shawsheen-river supply. In the first place, if I understand the testimony, the Shawsheen supply is vastly in excess of what the city of Cambridge needs, and the Stony-brook supply is ample for all her present necessities. The expense of constructing the water-works and the conduit from the Stony-brook supply to Fresh pond is not more than half the expense of constructing the same conduits and facilities between the Shawsheen river and Fresh pond, as shown by this map. I think the most severe criticism which Mr. Russell made upon the position of the city of Cambridge, with reference to the Shawsheen river supply, was the fact which he stated with regard to the undigested information, as it were, respecting the expense attending the construction of the works necessary to obtain that supply, — a reservoir of eight hundred acres, every foot of which should be thoroughly excavated for the purposes indicated in the testimony of Prof. Wood, the expense unknown. Taking that view of it, the expense connected with the Stony-brook supply and the Stony-brook basin would be very much smaller. Of course it takes very much less space to furnish a daily supply of ten millions of gallons than it does twenty millions. So that, in every aspect in which you can consider the claim of the city of Cambridge, whether with reference to an arrangement with the city of Boston, or with reference to the proposition to take the water of Stony brook, it is very clear, certainly, that the city of Cambridge ought not to be allowed to take the waters of the Shawsheen, — both of which sources, the Stony brook and the city of Boston supply, are much more accessible, and the taking of which would be attended with much less expense. I do not know whether the matter of expense has been considered or not. I recollect to have heard one of the ablest representatives from Cambridge last year, in discussing the matter of the bridge which was to be constructed between West Chester park and the city of Cambridge, oppose it on the ground that the present financial condition of the city of Cambridge was not such as to allow that city to indulge in any extravagance of that kind, to wit, its share of the burden of building a bridge from West Chester park across the Charles river; and yet,

if I am correctly informed, by the estimates of Mr. Barbour himself, it appears that the expenditure required, — although water supply is not one of the matters included in the act limiting municipal liability, — it appears from the testimony of Mr. Barbour, as unsatisfactory as it is, that the city of Cambridge is to be called upon for an expenditure vastly in excess of what it was proposed to expend upon that bridge. Now, if there is any such embarrassment in the financial affairs of the city of Cambridge as was stated on the floor of the House last winter by Mr. McSorley, it is certainly a matter to be considered by this committee, even although a debt created in furnishing a water supply is one which does not come within the scope of the act limiting the liability of municipal corporations; yet it is a matter which may be considered by this committee, whether the city of Cambridge ought to be allowed to indulge in that expenditure under these circumstances.

I understand that there is no criticism of this bill. There has been no objection made to the provisions of this bill submitted by the town of Andover.

Mr. HAMMOND. — I have not seen it before, Mr. Brown. I suppose they have not got anything in there that says that Cambridge shall not take the water, have they?

Mr. POOR. — No, sir.

Mr. HAMMOND. — If there is nothing in there that limits our rights, I do not know why we should object.

Mr. RUSSELL. — We did not think it necessary, brother Hammond.

Mr. BROWN. — I think we might put in here that you shall not come here more than three or four years in succession.

Mr. HAMMOND. — I do not object to that language, "three or four years more."

Mr. BROWN. — It being understood, Mr. Chairman and gentlemen, that there is no serious objection, or no objection whatever, to this bill, I see but very little which I can add to what has already been said, unless — I hardly need say "unless," for I understood my brother Hammond to say yesterday, in trying to secure his opportunity to speak last, that nobody objected to the claim of Andover. Am I correct, brother Hammond?

Mr. HAMMOND. — I should not oppose the project of Andover to take the water. Of course, so far as it might be inconsistent with any plan that the committee may devise for the taking of the water by Cambridge, I should oppose it; but I do not think it is inconsistent. I want to be fair about it. I think Andover ought to have the right to take water from its own stream.

Mr. BROWN. — I so understood it yesterday; and in that view I do not care to occupy your time, and will give what remains of mine to brother Hammond.

CLOSING ARGUMENT OF HON. ANDREW J. BAILEY,
FOR THE CITY OF BOSTON.

ON THE PETITION OF THE MAYOR OF BOSTON FOR AUTHORITY TO
TAKE WATER FROM SHAWSHEEN RIVER, BEFORE THE COMMITTEE
ON WATER SUPPLY AND DRAINAGE.

MONDAY, March 19, 1883.

Mr. Chairman and Gentlemen of the Committee: —

I appear here, as I said at the opening, on behalf of the city of Boston, under the following order, passed by both branches of the city government, and approved by its Mayor: —

“*Ordered*, That His Honor the Mayor be requested to petition the next General Court to grant the city of Boston authority to take the waters of Shawsheen river for its water supply.”

In obedience to that order, under the instructions of a committee of the present city government, I have been here on this matter. This is the third year in which the city of Boston has come for the same purpose. Besides the order passed by the city government, there have appeared before you to testify to the needs of Boston for this water, the City Engineer, Mr. Henry M. Wightman, a man concerning whose ability nothing need be said before any committee of this Legislature, at least; Mr. Malcolm S. Greenough, for several years a member of the Committee on Water of the City Council, and for some years its chairman, the Managing Engineer of the Boston Gaslight Company, and a man who for years has devoted a great deal of time to studying the questions connected with water and water supply, both in this country and in Europe; also Mr. Leonard R. Cutter, the chairman of the Boston Water Board; Mr. Timothy T. Sawyer, also a member of the Board, and for several years previously a member and the chairman of the Mystic Water Board,—a man probably than whom no one is more familiar with the Mystic system in the city of Boston. These gentlemen have all been here to show you why Boston desires this water.

What is the case which we present to you? We show you that the city of Boston is supplying to-day that portion of the city called the Charlestown district, the cities of Somerville and Chelsea, and the town of Everett, with water from what we call the Mystic system,—supplying a population of eighty-five thousand people, according to the census of 1880, from a system having a supply of but seven million gallons in a dry season. The report of the Boston Water Board, and the testimony of the gentlemen whom I have named, show that for

the last few years there has been a drain from that supply of over seven million gallons. During the very last year a supply of seven million one hundred and ninety-four thousand gallons was called for from these works. We have shown you by testimony that in the year 1880 there was such a want of water that engines had to be put in at Mystic pond to pump the water from our reservoir into the conduit; in other words, that the water was down below anything that a due regard for the safety of the people in that section of the city ought to permit. Therefore the city came here, and still comes here, asking for authority to take additional water to supplement that supply. Under these circumstances, with that scarcity of water in a dry season, when these people should have an abundance, and when they are put in the perilous position of depending almost upon a hand-to-mouth supply, if there were no opposition would you not say to them: "If you desire to spend a million and a half of dollars and go elsewhere to obtain a certain and a sufficient amount of water, you can do so"? In other words, has not the city of Boston, in the absence of any opposition, made a case on which you would say she should be entitled to take water if she was willing to pay for it? I have no hesitation whatever in assuming that there would be no unwillingness on the part of this committee to grant this request.

Now, who opposes this request of the city of Boston, and on what grounds do they base their opposition? The city of Cambridge does not oppose it. And I pretend to say that nobody opposes it except Capt. Bradlee. He is the only party who is here to-day opposing the request of the city of Boston for this authority. I do not know of another single person who is here; I fail to see them; I have not heard from them. And if I am wrong, my brothers will correct me.

Mr. RUSSELL. — Whom does Mr. Robert M. Morse represent?

Mr. BAILEY. — Whom does he represent?

Mr. RUSSELL. — The Smith & Dove Manufacturing Company.

Mr. BAILEY. — Mr. Chairman, I would not for one moment claim that he did not represent the Smith & Dove Manufacturing Company, were it not for the fact that my brother Morse and my brother Russell, in their arguments, claimed that the city of Boston did not appear here because the members of the city government,—because its mayor and its committee are not here. If that is any argument that they do not intend to be here, where, pray, is the Smith & Dove Manufacturing Company when it only appears here by counsel? If the city of Boston, in the language of brother Morse, makes a beggarly appearance before this committee because the members of the government do not appear, where does the Smith & Dove Manufacturing Company stand when it is in imminent danger of being starved out of existence, as it claims?

Mr. RUSSELL. — They have been here all the time. Mr. Stevens is here.

Mr. BAILEY. — Mr. Chairman, I made this remark for the purpose of calling out this opposition. My brothers Morse and Russell both argued before this committee that the city of Boston had no interest in this matter. Why? Because, they said, its mayor and officers were not here, when the fact was that the Committee on Legislative Matters have been here every day, just the same as these opponents have. I have said this to show that there is just as much interest in this matter on the part of the city of Boston as there is on the part of the Smith & Dove Manufacturing Company, and the others who are opposing it. My brother Morse, or my brother Russell, — I don't remember which, — made the remark that he had seen a member of the city government who did not know anything about this petition, and told him he would see the City Solicitor, and find out about it. Now, I suppose there are scores of cases in the courts of this Commonwealth in which the city of Boston is a party; and if it is to be accepted as an argument that the city takes no interest in the result of the litigation because the members of the city government are not in court, the city would never have any interest in any case. But the fact is that there is a deep interest in this matter. And the fact is also that the appointed officers of the city of Boston to look after the water supply are the Boston Water Board, and they are here, and have been here for three years, persistently knocking at the doors of this Legislature for authority to take a supply of water to keep the people in this district where they shall not be in danger of being destroyed by some great conflagration; and they show a sufficient interest which no efforts on the part of my brothers can make you believe is not there. So I am willing to acknowledge that these opponents are here just as the city is here, viz., by its counsel and proper representatives, and because they are here, they should be considered as before this committee in earnest in their opposition. I am willing to grant it on the same ground that I claim that they should not dispute the earnestness of the city of Boston to obtain this water when we appear only in the same manner. And now I go back and ask again, Who opposes our petition? And I admit that the owners of mills on this stream, and the town of Andover oppose it, and they are properly here.

Now, on what ground do they oppose the taking of this water? First, they say that if the city of Boston will harvest the water which it has already, — if it will be economical in its use, — then it has water enough to supply its people for years to come, and does not need the Shawsheen.

Second, that, if the city desires to supplement the Mystic system, it can get the water by crossing over, connecting the Mystic with

the Sudbury system, and building additional Sudbury basins, and that this can be done more cheaply than by taking the Shawsheen.

Third, they say that the city of Boston ought not to take the Shawsheen, because you, acting as the guardians of the interests of the people of the city, have been shown that they can get this supplementary supply, or this increased supply, in a cheaper manner than by taking the Shawsheen, by building basins on the Mystic.

Still another argument, and the fourth, is that, if we take this water, we destroy the mill interests on the Shawsheen river, and destroy the town of Andover.

Now, these are all the reasons urged against the petition of the city; and I propose to examine them, and see if any one of these claims is a substantial ground on account of which we ought to be required to look elsewhere for water.

First, in regard to the use of water in the city of Boston. What have they shown in regard to our extravagant use of water? They have simply shown that at different times during the last few years the Mayor has issued a proclamation or notice to the citizens of Boston, calling upon them to be more economical in the use of water. Now, that demonstrates one thing, certainly; it demonstrates that we were short of water. And if, at that time, owing to the notice of the Mayor, the people did cease to use water in the free manner in which they had used it before, it shows that they appreciated the situation, and stopped. Still it does not show that previous to that they had used more than they ought. Then they claim that because the city of Worcester has limited its supply to forty-two gallons per day by the use of meters, the city of Boston can do the same thing. And it is simply from these two things that they argue that the city of Boston is not economical in the use of water.

Now, I submit that is no fair reason, and no fair ground for this claim. Is there any comparison between the manner in which water is used in Boston and the manner in which water is used in Worcester? Is there any comparison of the different uses that are made of water here and there? Is it gone into to such length as to show, that while, as we all know, there is an immense water-front in Boston, with ships and steamboats coming constantly to our wharves to take water, in Worcester there is nothing of the kind. And whereas in Boston we have drinking-fountains at almost every corner, is there any such thing shown about the city of Worcester? Throughout the city of Boston are scattered public fountains for the use and enjoyment of the inhabitants, and to add beauty and attractiveness to the city. Is there anything of the kind shown about the city of Worcester? There are large sugar refineries along our wharves using an immense amount of water; is there anything to show that such exist in the city of Worces-

ter? So that the using of ninety gallons per head does not prove that we are extravagant. How is the amount consumed determined? The whole amount of water that passes over the dam at the pond is ascertained, — the exact amount of water running into the conduit is known. This whole amount is ascertained and divided by the number of inhabitants in the city of Boston, and the result is claimed to be the amount per head consumed or used. Now, because the city of Boston, under circumstances I have described, with its immense mercantile interests, and its demand for water for every conceivable purpose, uses ninety gallons per head, while the city of Worcester, entirely differently situated, uses but forty-two gallons per head; is this proof that there is a want of economical use in the city of Boston? I submit there is not the slightest particle of evidence, other than I have mentioned, to show that we are not economical in the use of water; and I claim that the city of Boston, so far as any evidence is concerned, has used water as economically as any other city. I might also allude to the city of New York, situated as Boston is, which uses almost an equally large supply *per capita*.

Now, let us consider the second reason against our taking the Shawsheen, — that we can make connection with the Sudbury works, and get all the water we want cheaper than by taking this river. I admit that that is a fair consideration for this committee, and if it can be shown that we have an abundant supply of water in the Sudbury system, and that we can just as cheaply, or nearly as cheaply, — put it that way, — supplement the Mystic supply from the Sudbury system we ought to be required to go there instead of disturbing anybody on another stream.

What are the facts? We have daily from the Sudbury and Cochituate thirty-two million gallons, — twenty million gallons from the Sudbury, and twelve million gallons from the Cochituate, — every drop of which is used for the supply of Boston every day, and the city is now engaged in building a basin that will supply five million gallons more, the evidence being that this supply of thirty-two million gallons was taken up within a few thousand gallons. So that, so far as the present supply of water which that system can furnish is concerned, or can furnish when the other basin is completed, there is not a bucketful that can with safety be taken from the Sudbury district. Well, they say, that is so; we will admit that. But, they say, you can build other basins on the Sudbury, and then make connection with and supply the Mystic. Let us consider the question of the cost. The testimony of Mr. Wightman is that it will cost \$500,000 to make that connection between the Sudbury and the Mystic systems; that is one item. It will cost \$500,000 more to build those basins. So that one million dollars will be required to

get a supply of five million or ten million gallons over to the Mystic system. Now let us see if this is more economical than to go to the Shawsheen river. We have the testimony of Mr. Barbour, the Engineer of the city of Cambridge, and of Mr. Wightman, the Engineer of the city of Boston, supplemented by the testimony of Mr. Edward S. Wood, a professor at Harvard, that the Shawsheen is as good water as, if not the best that, can be obtained in this vicinity, and that there is an abundant supply, amounting to twenty million gallons per day, at a cost less than \$1,000,000,— more than double the amount that can be obtained from the additional Sudbury basins at the same cost. In other words, in going across to Sudbury river and connecting that system with the Mystic, we have to pay an equal amount of money for less than half the quantity of water which we can get from the Shawsheen. I submit that these are the exact figures. Therefore, so far as their first two objections are concerned, — that if we were economical in the use of water we would have a sufficient supply, or that if we supplied the Mystic system from the Sudbury we would have a sufficient supply, — they are met by these figures, just as they are given in the reports; and I defy anybody to contradict them.

Mr. RUSSELL. — You claim the whole of the Shawsheen.

Mr. BAILEY. — I say the whole of Shawsheen, the city of Cambridge aside. Now, then, suppose you give us the water in connection with Cambridge, why, we get a proportionately less amount of water at a proportionately less amount of cost. That is where it is. So that if we had three-fifths of the water given us, instead of having to pay the \$1,000,000 that we should have to pay on the Sudbury for between five million and ten million gallons, we get twelve million gallons from the Shawsheen at about \$600,000. Now, if you are going to sit here as the guardians of the pockets of the citizens of Boston, I submit to you, gentlemen, in all fairness and candor, does not the argument fall entirely to the ground, that we can be supplied from the Sudbury-river system cheaper than we can be supplied from the Shawsheen?

Now, then, there is another argument. They say we can increase the basins on the Mystic, and thereby get all the supply we want. Now, Mr. Chairman and gentlemen, in addition to the fact that the supply of water in the Mystic is so fearfully short,— in addition to that, what testimony do we have here? We have it shown to you that the Mystic pond, which is the basin for keeping our water until we want to use it, is to-day in the very heart of one of the most thickly-settled communities, outside of Boston, in this Commonwealth. With twenty-six square miles of water-shed, there is a population of twenty thousand people. Now, it is not required that I should submit anything on that point beyond the testimony of Mr. Wightman,

that you will find in the report. His testimony was that that basin cannot be used for a great while, because the discharge of offensive matters upon the soil, and the water falling upon, and percolating through, will carry the impurities into the pond, so that the water will not be fit to use for a great while longer, and no amount of drainage can take it away. Now, here is where all our water must stand, until we use it, in the midst of this thickly-settled community, and we are asked to supplement such a reservoir, by building basins at the cost of a million of dollars, to eke out what we have now. Is that the part of economy? For what is the testimony which has been given, and on which my brother Russell put so much stress in his argument in regard to the Richardson basin, or Basin No. 6, on the Mystic? I do not think he intended to convey the idea that this basin could be built for \$109,000. The cost of it is \$672,000; but he will find that he conveys the idea that it cost but \$109,000.

MR. RUSSELL. — I referred the committee to a table in which it is put down at \$672,000. The extra cost is \$109,000, and that is for a dyke, I suppose.

MR. BAILEY. — I will read, so that you may see what he says:—

There is one large basin, No. 6, that is contemplated on the Mystic, and to that he does state the objections. What are they? First, the cost (\$109,000) of erecting a dyke; second, the shallowness of Basin No. 6 when it is constructed. Are these sufficient reasons, gentlemen, for not developing a basin which will give a storage of ten hundred and forty-two million gallons? Ten hundred and forty-two million gallons, at a cost of \$109,000 for building a dyke. It is less than one quarter of the cost of cleaning out their basin on the Shawsheen.

So that I say that, while not intending to give that impression, his language does convey the idea that that basin can be built for \$109,000, instead of \$672,000.

Now, let us examine the cost of this basin in comparison with the cost of the Shawsheen basin. Basin No. 6 of the Mystic is a basin of three hundred and twenty-three acres, capable of yielding five million gallons, which will cost \$672,000 and must supplement the Mystic upper pond, which must very soon be given up. Well, how is it with the Shawsheen? A basin of eight hundred acres, yielding twelve million gallons, if we build with Cambridge,—nearly three times the amount of No. 6,—can be built for exactly the same sum. Is that the part of economy for the city of Boston? Will you ask them to spend \$672,000 to build a basin to supply five million gallons, giving just about what we are using to-day, when by going elsewhere we can get nearly three times the amount of water for the same price? Is that the policy that anybody would advocate that the city of Boston should follow? Further, let us examine the territory. As I said, twenty-six square miles is

the water-shed of the Mystic basin, including the Richardson pond, and the population of the territory is twenty thousand to-day. The supply of water, therefore, can be measured at the very outset; Mr. Wightman says twelve million gallons and some others say fifteen million gallons, while the water-shed of the Shawsheen supplies twenty million gallons, with a population of only three thousand six hundred people on thirty-four square miles. Now, tell me, is it the part of economy to say to the people of Boston, You shall go on building up these mud-holes on the Mystic instead of going where there is less chance of pollution? Even my brother's report, which he has put in here for Capt. Bradlee, shows above all things the consummate purity of the Shawsheen over every place that has been examined.

The following table shows the relative density of population, and the number of manufacturing establishments per square mile of drainage area of five basins used, or proposed to be used, for sources of water supply.

Mystic river, above the lake; population within the water-shed per square mile, six hundred and ten. Six hundred and ten persons for each and every square mile in that water-shed! And the number of manufactories, 2.93, — we might say three. Shawsheen river, above the Lowell Railroad; population within the water-shed to the square mile, .79.

Just about one-eighth of what there is in the water-shed of the Mystic river. And the number of manufactories per square mile, .12, in place of 2.93 in the Mystic. Why, gentlemen, is not this alone sufficient to justify the city of Boston in spending a million dollars for the Shawsheen river, and giving up every drop of the Mystic at once? So much for the economy of requiring the city of Boston to enlarge its basins on the Mystic, and to supplement that supply.

Now, the fourth argument against our being allowed to take the waters of the Shawsheen. The only remaining argument that was raised is, that this taking will destroy the mills at Andover, and that it will destroy the town. I think that is putting it to the full extent.

The CHAIRMAN. — The Lexington people protest against taking their source of supply.

Mr. BAILEY. — Well, there is no objection on our part to putting into the bill a provision that they may take water from any source of supply in their town, as long as they do not use our basins, which are away below Lexington.

So I say the only other argument remaining is that we shall destroy these mills and the town. Do you believe that the Smith & Dove Manufacturing Company will be ruined; or do you believe any mill will be ruined? Do you believe, with the interest shown by them here, that they have the slightest idea that they will be ruined if we

take this river? Do men, when they feel that they are to be ruined, sit quietly by and content themselves with sending their attorneys to the State House to remonstrate? I do not propose to be unfair, and I admit that the testimony they have already put in is to be referred to as though they were here. But that is not the point. You would find this State House, with these six mills, as prosperous as they are, with the town of Andover depending upon that prosperity and its support from the mills, — you would find these people in the room until the room was packed if they had an idea that these tremendous consequences were about to fall upon them.

Mr. RUSSELL. — Let me ask you if you have read Mr. Hammond's statement of what a stir they did make.

Mr. BAILEY. — No; I have not. We all know how flowery the imagination of my brother Hammond is. There is nothing that can limit or bind his muse.

Mr. FOSTER. — I would like to ask one question. You say if they were so greatly interested they would fill this room. If the people of Boston are so interested in this matter, why don't they fill this room full?

Mr. BAILEY. — Simply for this reason: The Water Board is here asking for that which is clear. Our needs are perfectly plain. Mr. Wightman has shown you what the needs are; and there is no necessity for the people being here. We want a certain amount of water; we have a certain amount of water; we use more water than we have, and, therefore, we must have more. It is a matter of mathematical demonstration.

Now, what is the testimony about the ruin of the mills? You do not find Captain Bradlee even saying that his mill will be destroyed. He says he thinks it will, because he says he won't go anywhere else; and he says IF you take away the water from him he will be destroyed. Now, if you will read these reports carefully, you will find in the argument of my brother Stackpole, who was counsel in the Sudbury-river case, that this same cry was raised by the mill-owners at Saxonville, that they were to be destroyed, that their industries were to be destroyed, and their mills would have to be closed. What is the fact to-day? We are compelled to allow a million and a half of gallons only to go down that stream, and, as brother Russell says, we have taken every drop of water except that amount. And yet there is not a mill closed or a spindle less running in Saxonville or any other of these towns to-day. Talk about the bleachery there! Why, you are all familiar with the bleachery in Somerville, — one of the largest cotton bleacheries in this country. That is supplied to-day, I think, by the city of Cambridge with water, and they do all their bleaching with it.

Mr. RUSSELL. — Where is that?

Mr. KINSLEY. — In Somerville, — formerly owned by James Lee, — and supplied with water by Somerville.

Mr. SMITH. — Would you think it wise and right, sir, to take water from a mill that is now using it for bleaching purposes, convey it twenty miles, and give it to another mill that is using it for the same purpose?

Mr. BAILEY. — No, sir; not for that alone. But let us look at that. The city of Boston to-day, if it gives up its Mystic system, wants eight million gallons per day, and the city of Cambridge wants at the outside two million gallons per day. That is ten million gallons. That is all they will want of this twenty million gallons at present. There will be ten million gallons remaining. Now, what will be done with that? All that will be required by both cities for five or ten years will be only one-half the supply. Do you imagine that Boston or Cambridge would sit like a dog in the manger and say to the people of Andover, “You cannot have the rest”? The fact is, if a dam is built, there will still be ten million gallons to run down the river for years to come. And yet we have the testimony before this committee that, if that water is taken away from the Shawsheen, the bed of the stream will be dried up, and pestilence will stalk abroad through the town. Still further, besides this amount of ten millions of gallons, there is the further supply from the twenty-four miles of water-shed between our dam and the town of Andover, so that there will be almost, if not quite, fifteen millions of gallons per day to be supplied to Andover and its mills for years to come, if Cambridge and Boston are given a bill. Now, is Andover a very salubrious town at the present time? What is the evidence? I will read to you from the testimony of Dr. W. H. Kimball, in 1881: —

My observation has been that, when the water has been drawn off, and left the flats exposed through the hot weather in the summer, sickness has materially increased in the villages there. This has been done since my residence in Andover two or three times; and I remember the old physician who practised there before me said he always expected half the children to die when they drew off the water and left the flats exposed.

By THE COMMITTEE. — Did you say half the children died in Andover?

A. No, sir; not in Andover. That was the remark of an old physician, — that half the children in the two villages there usually died when the water was drawn off early in the season.

Q. Do you mean half the children under two years of age?

A. Yes, sir.

Q. Has that been your experience, doctor, or anything like it?

A. I think, when the flats have been exposed, there has been a very great fatality in these two villages; dysentery has prevailed there to a very great extent.

This, gentlemen, is the condition of Andover with the great abun-

dance of water it gets now. The water is drawn down, the flats are exposed, and pestilence has prevailed in the town. Shall we make it any worse if we take the mills (paying the damage), and leave a steady, constant stream flowing from our dam with what comes into the river from the other twenty-six miles of water-shed, and no flats be exposed? The health of the town of Andover will be increased, if there is any truth in the argument, so that we shall certainly benefit the health of the town rather than injure it.

The CHAIRMAN. — I do not understand how, after taking what you want, you are going to leave more than there was before.

Mr. BAILEY. — I say, if we take away the mill-ponds, we allow a steady stream to flow down, and then the health of the town is to be better. There will be no mill-ponds and no flats.

The CHAIRMAN. — That is on the supposition that you are going to destroy the mills?

Mr. BAILEY. — On the supposition that we take the water, and the mills run by steam, and take their water for bleaching purposes from a pipe, as the Somerville bleachery does.

Mr. POOR. — You will observe that Dr. Kimball said that the pestilence had occurred but once or twice in thirty years.

Mr. BAILEY. — He said the old physician who preceded him had remarked it often, and that he, Kimball, knew of its occurring two or three times.

Now, these are the arguments that are urged against the claim of the city of Boston. I submit that we have shown the fact that on account of the shortness of the water supply, and on account of the improper condition of the valley of the Mystic, we shall be compelled in a short time to abandon it. Now, is it or is it not wise economy for the city of Boston to come here, before the time when we have got to use the water, and prepare the basin so that we can use it? The testimony before this committee has been that we could not take Sudbury water and give it the proper attention it deserved, because we had to use the water immediately. And the testimony of Professor Wood was, that if this basin or these basins were taken, and without anything being done to them were allowed to stand five or ten years, they would become natural ponds, and the water would be clear and fresh as in other natural ponds. Now, I say that, in view of the fact that we must go elsewhere for our water supply, we must give up the Mystic, and that we want to use what part of it we can, — the pumps, the engines, and the lines of pipe, — therefore the only thing we ought to do is to supplement that system. Is it not, then, wise economy for the city of Boston to take this Shawsheen river, yielding a sufficient supply? A question has been raised in regard to the economy of it. There is one illustration which shows better than I can

exhibit in any other way the economy of taking this supply. We are to-day getting a supply of twenty million gallons from the Sudbury river; and it cost to-day \$5,350,000 for taking this twenty million gallons and pouring it into Boston. Here we can get the Shawsheen river, in a less thickly-settled portion of the country, and get a supply of exactly the same quantity for less than \$1,500,000. If it is economical for the city to take Sudbury river, nobody can contend that it is not economical to take the Shawsheen. Therefore, I ask again, is it not wise economy for the city, under such a condition of affairs, to build the Shawsheen basin just as soon as it can, in order that, having built it, and collected the water, it shall have time to stand until the people want to use it, and thus allow the basin to prepare itself by the action of time, and get into the condition of a natural basin? That is what the city desires, and that is what it is here asking you for. Not that we want to use it to-day, but that the time must soon come when we shall want it. And it being the case that that thirty-four square miles of water-shed contain only thirty-six hundred people, is it not apparent to every man that the city of Boston could afford to buy every foot of that thirty-four square miles to-day, and preserve it for all time clean and pure?

Mr. RUSSELL. — You do not propose to purchase the town of Andover?

Mr. BAILEY. — The town of Andover does not form a part of the water-shed.

There is one other matter that has been alluded to. [Referring to the map.] This basin, as the committee will see, is here. Allusion has been made to the city's going to the Concord river, or to the Merrimack river. Here is the Merrimack river. The testimony shows that it is only eight miles from this basin; but the Concord river, that we have also been told we should go to, is only four miles from that basin. But the testimony, when Mr. Davis made his first examination, as has been shown by the report, was to the effect that the water of the Merrimack could not be used unless a subsiding-basin was provided, so that the impurities of sand, grit, and clay held in suspension could be allowed to settle. He has told you that, no matter where we go, we must have a subsiding-basin. Where can we get a basin holding two billion gallons, that can be used as a subsiding-basin? Put your engine there at the Concord river, or on the Merrimack, and pump the water into this Shawsheen basin. It makes no difference where you are compelled to go in the future,—to the Merrimack, or to the Concord,—there is the basin that the city must have to use the waters of either river.

Mr. RUSSELL. — Have you examined that?

Mr. BAILEY. — It has been examined.

Mr. RUSSELL. — I don't think any of the reports refer to it.

Mr. BAILEY. — I do not think they do.

Mr. SMITH. — If you go to the Merrimack you go above Lawrence?

Mr. BAILEY. — Either above or below.

Mr. SMITH. — If you take it above or below, in order to avoid impurities which come in from Lawrence and other places, you would need to go very near to Haverhill? You would need to go below the fall, which goes over a shallow place; and there is a fall there where the water becomes purified by running over that fall. That would take you near to Bradford, and that would be very near the lower part of the map; and the distance from Boston or Cambridge to that point is not so much more than to Shawsheen, where you propose to take it, and you get there an abundant supply of water for all needs, and you injure nobody in the world, because you go below every mill, and you can get a basin in that neighborhood, on the high ground, that would give you a gravity flow into Boston.

Mr. BAILEY. — Well, what is the area of that basin?

Mr. SMITH. — That would depend. You could make a basin there.

Mr. BAILEY. — There is not another place anywhere near the border of this river, in the neighborhood spoken of, in which a basin like that can be constructed.

Mr. SMITH. — I presume you could not get a basin there of eight hundred acres, or one quarter of it.

Mr. BAILEY. — What we want is a large basin.

Mr. SMITH. — You do not want it as large as that for any natural purpose.

Mr. BAILEY. — All the testimony is to the effect that the larger the basin the better the water will be.

Mr. SMITH. — It depends upon the character of the basin, I suppose, in that respect. Now, do you think it is desirable to take the Shawsheen and destroy Andover, and then, when you have used that all up, go to the Merrimack and get all you want for all time? Why not go to the Merrimack at once?

Mr. BAILEY. — The trouble is, that you assume that we should destroy the town of Andover, which we deny.

Mr. SMITH. — I assume this: That the Shawsheen is of just as much value to Andover in its material interests as the Merrimack is to Lowell or Lawrence, precisely.

Mr. BAILEY. — Well, if the testimony before this committee or any committee is sufficient to warrant them in saying that the town of Andover will be destroyed, I am perfectly willing to give up the case. But I believe that any reasonable, unprejudiced, and disinterested man who has heard the testimony, and read the testimony given at the previous hearings, must say that it will not harm it in the least.

Why, the professor who appeared here, and whom my brother Russell treated with so much respect, and whom everybody did who knew him, or of him, said that it would detract from the academical reputation of the town if the students did not have this river to boat on. This river, which is so shallow that at times it is exposed so as to make people sick, which sometimes is nothing but a thread, is to affect the success of a theological seminary. If you believe any such theory, well and good. I do not believe that if the water is taken for the supply of Boston there will be one mill less running on that stream, or that the town of Andover will suffer one particle of harm.

MR. RUSSELL. — I would like to ask if there is anything in the evidence of any engineer in favor of adopting that basin as a basin to be used in connection with taking water from the Merrimack?

MR. BAILEY. — I refer to it as a plain suggestion, from the nature of the country. I think it has not been referred to in evidence; but I submit it as an argument drawn from the situation of the country. Now, in regard to the destruction of these industries at Andover. Take the objection made by Capt. Bradlee,—because he is the real objector,—and I would be the last man to say a word against him, because if there is one man in Boston who is deeply interested in her affairs, who has occupied positions of the highest responsibility in the city, it is Capt. Bradlee; a man public-spirited in everything he undertakes, and his whole interest is a matter of sentiment, because he cannot go into anything, no matter what, without his enthusiasm taking possession of him. His very treatment of his operatives, the way in which he has carried out improvements, built houses, and established schools, is evidence of the enthusiastic manner in which he goes into all his enterprises. And yet I ask you to look at the testimony of Capt. Bradlee, and of the witnesses offered by him, and see if you can find one particle of evidence to justify you in saying that you believe his mill will be destroyed. All that he says is that he must have the water to wash out his flannels, and he must have the head. But there is no evidence of how much water he needs, or how much head he requires. It is all indefinite. There is not a particle of evidence nor a claim as to how much is required, nor how much he wants; but he simply says that he must have it. I say, therefore, that you should examine this claim in the light of the fact that the city must have more water,—examine it carefully,—and see if you honestly believe that there is any danger of these mills being shut up, or the town of Andover injured. Now I leave the case in your hands. We do not say anything about the terms of the bill. All we do say is that we want that water. We have shown you why we want it; and we say to you, if you see fit to say we shall take so much and no more, take it with Cambridge, or that we shall have the whole, we are

satisfied, and shall abide by your decision. But we ask you to look at the case in the light that Boston is in need of water ; that this Mystic system is inadequate, and the water is getting impure, so that it will be dangerous in a few years for people to use it ; and then, — taking the testimony before you as to the economy of other sources, and the fact that we can get four times as much here as in any other place for the same amount of money, — then say whether we should be allowed to take it.

MR. SMITH. — You go in for economy. Don't you think it would be economy for the city to go to the Merrimack ? In ten years would it not be cheaper than to take up all these mud-holes about Boston, and then go to the Merrimack afterward ?

MR. BAILEY. — The water of the Merrimack is not fit to be used unless we have a subsiding-basin. If we go to the Merrimack we shall still want this basin.

MR. RUSSELL. — Lowell and Lawrence use it.

MR. BAILEY. — There is no evidence of it. We have the testimony of Joseph P. Davis, one of the most accomplished engineers of this country, whose report has been given us against using that water ; and, until somebody of equal talent with Mr. Davis comes to show us why we should use it, we shall rely upon his report.

MR. POOR. — You did not hear the letter from Mr. Francis, read by Mr. Russell ?

MR. BAILEY. — I did. He did not say one word about the purity of it. He simply says that a certain portion of it is drawn.

MR. RUSSELL. — That is true ; in his letter he did not. But he said he would like to show me the water he had on his table. It is purer than any he has found elsewhere. They take five-eighths of their water out of the river without filtering.

MR. BAILEY. — There is no evidence before this committee, nothing but mere speculation, about the Merrimack. We must pump the water from the Merrimack if we ever take it, and we must have a settling-basin whether we take this one on the Shawsheen or some other. The discussion has turned to a new question, about which no evidence has been introduced.

And I therefore leave the case for the consideration of the committee.

CLOSING ARGUMENT OF J. W. HAMMOND,

IN BEHALF OF THE CITY OF CAMBRIDGE.

Mr. Chairman and Gentlemen: —

I regret that I am obliged to address a committee who have already listened for several hours to the arguments on this matter, more especially as I cannot think that anything that I can say will be either as instructive or as interesting as what has been said by those who have preceded me.

Before proceeding to the discussion of the main question, I desire to say, with reference to the town of Lexington, that in so far as Lexington desires a provision in the bill reserving the right of the inhabitants of that town to use the waters of any tributary of the Shawsheen, I make no objection; but in so far as Lexington asks for a right to pollute the waters of the Shawsheen, of course I should object; and in so far as it asks to have any unusual provisions in this bill, I should object. I think this water bill should be like any other water bill, with the same general provisions; and, as my brother Scott said that there was nothing peculiarly sacred about the rights of Lexington water-polluters, I do not see that they should have any extra protection.

Now, this discussion has been — I hope the gentlemen on the other side will pardon me for saying it — somewhat rambling in its character, and perhaps I shall not improve upon it; but I desire, in as brief and concise a manner as I can, to call your attention to the precise matter in issue, and to present the considerations which seem to support the proposition which Cambridge submits. I will say here, once for all, that I shall say nothing about Boston. I shall leave my brother Bailey to take care of that city. He is amply able to do it. I shall confine my remarks to-day simply to the case of Cambridge.

Cambridge desires to take from the Shawsheen river, at a point where it crosses the bed of the old Middlesex canal, a quantity of water not exceeding eight millions of gallons a day, to carry it to Cambridge, and, either through Fresh pond or otherwise, to distribute it to the inhabitants of Cambridge for domestic purposes. For this purpose it desires to construct a dam in the manner I stated to you in the opening, to flow certain lands, to lay certain pipes, and to do all other things necessary and incidental to that purpose. That is what Cambridge desires. This request she makes. It is a power she has not now; it is a power which, if she gets at all, she must get from the Legislature. That request has been referred to you, and you, for the

time being, are the eyes and the ears of the Commonwealth, to listen to this request of one of the largest cities within the Commonwealth. This request is not an unusual request; it is within the power of the Commonwealth to grant it. It is a request for the right to take private property for public uses. It is asked of you by virtue of the power under which you grant the right to make railroads and roads. That is now conceded. It was not at the first hearing. I remember that the attorney for the remonstrants said, at the hearing in 1881, that this did not come within the class of cases where the Legislature had the right to take private property; but of course that position is abandoned, and it is conceded here that, if a necessity is shown, the request should be granted.

Well, now, is a necessity shown here? This petition comes from a city which is absolutely in want of water. She needs two million seven hundred and fifty thousand gallons a day; she has one million seven hundred and fifty thousand, and is short, therefore, one million of gallons a day. It is true that, by using Fresh pond, and taking the water of Wellington brook at certain seasons of the year, we can, manage to fill up our pond, and hitherto we have gone through in that way. The city of Cambridge relies upon water furnished in this way, and has been obliged to rely upon it. You may go through this Commonwealth, and you will not find any other community in such dire necessities for water as the city of Cambridge has been for two or three years, and still is,—I mean in respect to quantity. What is the condition of the surface of the ground in this vicinity to-day? It is a matter of common knowledge and observation that there is not so much snow upon the ground as there ordinarily is at this season of the year. Our pond to-day is lower than it has been for years at this time in the year,—only two feet above the top of the water pipe through which we pump, several feet below high tide in Boston harbor, and sinking every day. How is that to be filled by the waters of Wellington brook?—and it is to be filled by the waters of Wellington brook, if at all;—I put it to you, gentlemen, now. Here is a practical question. The respondents concede our necessities, but yet I desire to remark here upon what they are. There is no better policy to adopt than to concede those features of an adversary's case which one does not want anything said about, and our friends upon the other side do not like to hear the necessities of Cambridge talked about; but those necessities are material, when you consider the question and balance the considerations whether it is more necessary for us to take than it is for Andover to have. Do you not see that we stand to-day in a precarious position as to the quantity of water? We can take Wellington brook only when the ground is frozen. This weather is rapidly bringing the frost from the ground; a few days more and it will be impossible,

no matter how copious are the rains, for us to take that water. There is no melting snow ; there is no snow to melt ; the ground is bare ; and there never has been a time, so far as I am aware, when the supply of Cambridge has stood as precarious as it stands to-day.

Now, our friends upon the other side will say that we have always managed to get through. We *have* always managed to get through, by the closest economy, and by running such risks as no city is ever justified in running if it can help it ; but I am speaking of what our necessities are, and what it is the duty of the authorities of Cambridge to do in order to relieve themselves from them.

So much as to the quantity ; now as to the quality. I intended to read, but I am not going to take the time to do it, from these pamphlets, to bring before your minds, in as graphic a manner as I could, the objections as to our supply on the score of quality. There are running into Fresh pond, and have been for some time, streams teeming with filth. I do not believe it would be a surprise to the physicians of Cambridge at any time to be obliged to say, from their observation of the condition of our water, that it was dangerous to sick people, at times, to use it. That is our condition, — one of the largest municipalities in the State in such stress as to the quality and quantity of its water. I say there is no parallel to it, nothing like a parallel to it, and never has been in this Commonwealth. I am talking here of a solemn and a serious matter ; it is not a sentimental matter. I will speak of that sentimental and monumental matter later. But I am speaking here of a solemn matter, — the question of a water supply for one of the largest cities in the Commonwealth, and what it must have or be depopulated. To my mind, the position in which we find ourselves would justify this Legislature in snatching from the people of Andover every drop of water of the Shawsheen. As sacred and as pure as it is, as much needed as it may be for the bathing of the students, we should be justified in taking it for the purpose of drinking.

Now that is our condition, and we come before the Legislature and ask you for the privilege of taking some water from the Shawsheen. What is the answer which our friends upon the other side make ? In the first place, they say, “ Go to Boston ! ” Well, what sort of a city is that to which we are asked to go ? In the first place, has Boston the right to supply us ? It is very certain that, if we make an application to Boston for water, she will say that she doubts whether she has a right to supply us, and any lawyer will tell you that it is a fair question for doubt. What authority has Boston to take the waters of Sudbury river or the Cochituate ? Why, the Act that authorizes her to take the waters of Sudbury river says she may take it (and now I quote the words of the Act) “ for the purpose of

furnishing a supply of pure water for the *city of Boston*." That is the purpose for which she can take that water. Now, if she lets any of that water go to Cambridge, she diverts it from the purpose to which, by the Legislature, she was authorized to put it. I say it is a serious question whether she has the right to furnish Cambridge, and it will be thrown at us if we go to Boston and ask for the right to take water from her supply.

Besides, what kind of water is it? Does the counsel for Andover here want to put Cambridge where the invalid person in his house is? Why, if you go into any decent restaurant in this city, you will find the statement printed on the bill of fare that they get their water from Everett or some other good spring. Is it necessary to speak to a committee, upon which members from Boston sit, of the character of the water in Boston for the last year? Nobody drinks it who can afford to buy spring-water. People are making fortunes by peddling spring-water. Go into the main thoroughfares, and you will find men selling spring-water by the glass. They want us to take water that the citizens of Boston do not want to drink. We have invalids in Cambridge, as brother Brown has in his family, and we want good water.

Now, you may say that Boston may get good water. It is true, she may; but is there anything in the history of the Water Board of Boston which indicates to anybody that the Boston Water Board will do what they ought to do?

Now, as to the ability of Boston to furnish what we need. The counsel upon the other side may say that Boston wastes water. That is something that Cambridge has nothing to do with. The question is whether she will continue to waste it. Have you seen, during your experience as legislators here this year or last year, any indication that the consumption of Boston is going to be reduced? You may think it ought to be reduced; you may think that if you were the Water Board of Boston you would reduce it. The trouble is, you may not be upon the Water Board of Boston, nor has Cambridge any representative there. Boston has now thirty-two millions of gallons a day, and she consumes between thirty-one and thirty-two millions. She is about building a new basin which will give her five millions more, that is all. I asked a representative of the Water Board here, who is admitted by all, I think, to be the most competent and fairest-minded man upon the Board, whether, under the present consumption of Boston, even with that additional basin, he would be willing to make a contract to furnish Cambridge with water, and he said "No." Is it fair, then, to tell us to go to the city of Boston to get water, over the management of which (you may say just what you please about that) we have no control, nor has this Legislature? Is it fair

to tell us to go to such a city to get such water as Boston has, when she herself, by her representative, says that she has not the ability to furnish us with water, and will not agree to make a contract to furnish us?

Then as to the terms. Is there anything in this hearing indicating that Boston, if she had the ability, and was inclined to furnish us with water, would furnish it on any reasonable terms? What do you mean by "reasonable terms"? See where Cambridge would be placed to-day. It appears that the only contracts that Boston has had anything to do with, and which she enforces, are contracts where from thirty-five to forty per cent. of the receipts are taken by the town which takes the water from Boston, and sixty per cent. is taken by Boston. Now, the water receipts of Cambridge have been about \$175,000 a year for the past few years. One-half of that is \$87,500. At five per cent., which is a fair rate of interest, that is the interest on \$1,750,000. If our water-rates in Cambridge shall be no greater than they are now, and if we give Boston only one-half of what we collect, if she should supply us, and that is a less per cent. than she has ever required from any other city, we should then pay her, even at our present rate of consumption, the interest on \$1,750,000. In 1890, taking Mr. Crafts' tables as the basis, our receipts would be \$240,000 a year. One half of that is \$120,000, which we should have to pay to Boston, and that is the interest on \$2,400,000. It is absolutely cheaper for Cambridge to pay \$1,500,000 to get an independent supply of water than to go to Boston even if she can make a better contract with Boston by ten per cent. than Boston has made with any other municipality. It is not a question of what Boston *can afford to do*, it is a question what Boston, with its present management, *will feel disposed to do*. Not Boston *as it should be*, but Boston *as it is*, is the customer we have to meet when we go to trade for water. Besides, I say that no such request should ever be made of a municipality coming here for the right to take water. I challenge my friends upon the other side, I challenge my Brother Brown, with his long legislative experience, and his longer observation of legislatures, I challenge the learned counsel who has just addressed you [Mr. Russell], to show us a single case where a petition like this has been refused by reason of some supposed theory of the committee or of the Legislature, that a bargain could be made with another municipality. Have we not the same right to independent legislation which every other municipality has? Is it a fair thing to say to us, when we come to the legislative mother of us all, "There is somebody else who has, perhaps, more than he wants, — a bad-acting person, it is true, — but somebody else that may possibly give you what you want?" Cambridge representatives vote here every year upon

general principles, and as legislators of the Commonwealth, to give other municipalities water. Let the same right be conceded to us, and let us stand, as every other municipality has been allowed to stand, upon the right of public domain, — upon the right to take, by paying fair compensation for it, that which you have given to everybody else upon the same terms. It is not fair to place us in any other position, — to bind us hand and foot and turn us over to the tender mercies of Boston, if my brother Morse's theory is to be admitted, or to, perhaps, the selfish instincts of Boston, if the ordinary action of mortals is to be taken as a guide. We have not tried hard to negotiate with Boston; we do not believe that we want Boston water; it is only to meet a present necessity that anybody in Cambridge thinks of going to Boston for water. We want better water. We want it where we can take care of it ourselves. We do not want to have our supply dependent upon a Board whose action, judging the future by the past, gives us no particular confidence. It is illogical, it is unprecedented, it is unfair for us to be obliged to meet this argument here.

Now, we have been here for three years. The first year the committee granted us a bill. The second year a minority of the committee were in favor of a bill, but they were induced to sign the report of the majority that perhaps we might get something from Boston; and that is the way the matter stands. We are now here for the third time, and we are met by another proposition, and that proposition is with regard to Stony brook. They tell us we can get an ample supply from Stony brook. I remember, about two months ago, trying a case before the Probate Court, on a petition by an administrator for leave to sell real estate. He wanted to sell more than was necessary to pay the debts, because, he said, the sale of a part would hurt the whole. My clients thought it ought not to be sold, and we opposed; and, driven to desperate expedients for a defence, I suggested to the judge that it was a question whether the administrator ought not to be allowed to mortgage rather than to sell. The answer which he gave me was a perfect answer, as it seemed to me. He said, "Well, I will consider that question when it comes up. I will then hear what there is to be said upon it, and then decide it." Now this Stony brook matter has come here. We have heard only one side of it. For aught I know, it may be a second edition of the Shawsheen, if we should start upon it. In 1879, our people went to the valley of the Shawsheen, and they found a splendid place for a basin, — solitary woods around it, — no people anywhere about; it looked to them as if there would be no trouble about getting the water of the Shawsheen. We put in our petition before the Legislature, and, as a matter of form, advertised, and up sprang a host! "There was hurrying to and fro," in the beautiful town of Andover, when the

news spread over the hills and valleys that *the Shawsheen was in danger!* Town-meetings were held; the staid Professors left their studies, went out into the open air, and came up to Boston. They appeared here against the project. The Unitarian heretics of Cambridge needed water! It was a cry sufficient to startle them from their long reveries. Capt. Bradlee also appeared upon the scene. What may be his theological views I know not, but it is perfectly plain that when he added his strength to the other strength arrayed against us, we had opposition enough. We found that although there were woods around where we proposed to construct our basin, a little lower down the stream there was something else besides woods, and the people down there appeared here, and they have made this fight, and they have raised an opposition of which in the beginning nobody dreamed. I never supposed that the Commonwealth of Massachusetts would be asked to say, when the pure waters of that stream were needed for the purpose of cooling the thirsty throats of Cambridge, that it should be devoted rather to the purpose of cleaning Capt. Bradlee's flannels, or the twines and shoe-threads of the Smith & Dove Manufacturing Company! That is what you are asked here to do, — exactly what you are asked to do. I supposed the question would be, as it should always be when the Legislature is called upon to pass upon any proposition of this kind, "Can this water be put to a better use, and is it needed for that use? Shall it be allowed to run down that stream and go into the Merrimack unused, and finally get to the ocean unused, or shall we put it to a better purpose, and where it is more needed, namely, for domestic purposes?" As I said before, I repeat here now (and it is difficult to argue a question three times without some repetition), he is a good legislator, and is acting upon sound and honorable principles, who puts to a better use than it has theretofore been put, anything within his jurisdiction. That is what I ask you to do here with the waters of the Shawsheen.

How do we know but that, in this Stony-brook region, there shall be some "village Hampden," some Capt. Bradlee, not yet known, but sure to arise when the emergency calls upon him? How do we know what are the energies of that little town of Weston? How can you be certain that, if you should hear both sides, you would say that the waters of Stony brook should be taken in preference to the waters of the Shawsheen? Can you, sitting here, and having heard only one side, say that you will sacrifice, if any sacrifice is to be made, the interests of the inhabitants of the water-shed of Stony brook rather than those of the Shawsheen? What peculiar sanctity is there with regard to the industries or the rights of the people in the valley of the Shawsheen? Year after year, you have taken river after river in this Commonwealth, — why not take that? If we should

drop the Shawsheen, as our friends upon the other side want us to do, and take up the Stony brook, it is not at all certain that, upon hearing both sides of that question, you would think we should have that any sooner than the Shawsheen.

The only question for you to consider is, whether you believe that Cambridge is sorely in need of water, and whether the water of the Shawsheen can be taken without damaging other people more than it helps Cambridge? Remember that the mill-damages, and all pecuniary damages for land taken, are to be paid by Cambridge. She must pay them before she takes the water, and there is nothing here to show that the interests on this little stream are different from those of any other.

Now, to show you the unreasonableness of the position of Andover, I want to allude to the bill which I presented here last year. It was a bill which compelled us to cause to flow, from the point where we take the water, a stream of not less than ten millions of gallons a day, a point where frequently not more than four or five millions a day passes. My brother Morse says that does not help things any; that the water as it goes down diminishes. He has got a stream that grows smaller the nearer you get to the mouth! Of course, it would be an advantage to have ten millions of gallons a day, instead of five millions, start from there. Is it any more likely to evaporate if it comes out of a reservoir than if it came out of the clouds?

Now, some of you may come from the western towns of the State, or you may have interests in those towns, and you know it is not an unusual thing for the mill-owners on the streams themselves to store water for the purpose of equalizing the flow to their mills, and it is a perfectly practicable thing to do in the valley of the Shawsheen, where, perhaps, two or three hundred millions of gallons may flow down one day, and only four or five millions another day. We put a provision in that bill that the flow should be equalized; and, as matter of fact, had that bill passed, and the water been taken under it, Andover would never have known that we were on the stream, or had anything to do with it. A majority of the committee say they think it would do no harm to any interest of Andover. Yet even that bill was opposed as strenuously by Andover as any other bill was ever opposed, on the ground, not that they thought it would hurt them as it stood, but upon the ground that if the Legislature once allowed the city of Cambridge to lay its hand upon the sacred waters of that stream, the hand would not be stayed until the whole had been taken.

I say, Mr. Chairman and gentlemen, — I am driven for time, and must leave out many things I intended to say, — I say the waters of that stream are the purest waters in this vicinity, and ought to be used for domestic purposes; that the necessities of Cambridge are

greater than those of any other municipality ; that we ought not to be required to do what you have required no other municipality to do, — to take water from Boston, I say that Boston is not in a condition to contract with us ; that the water of the Shawsheen is now wasted ; that if we build that dam, those mills will exist as they have heretofore existed. And I say still further (and it is strange to me that our friends upon the other side do not see it), — I say that if a bill substantially like that proposed last year, is passed by this Legislature, the water of the Shawsheen will be freed from further legislative interference ; because, if you give us a right to take that water, and compel us to furnish a certain amount below the dam, it is in the nature of a contract between the Commonwealth and these two municipalities. That contract would never be disturbed by granting the water to any other municipality. It would not be fair. After we have constructed those works, any other committee, any other Legislature would be slow to interfere with that arrangement, and the people of Andover would stand where they have stood heretofore.

I have had occasion, Mr. Chairman and gentlemen, to address committees upon this matter before ; but I never have felt, as I have felt at this hearing, so keen a desire that I might fitly represent the city of Cambridge upon this question. As I speak, and as the imminent danger which threatens our city unfolds itself before me, I am filled with apprehension lest I shall not properly present that picture to this committee ; and as I consider the unreasonable and illogical grounds which are urged here against our petition, I fear that I cannot show the inconsistency and the injustice of the opposition as they ought to be shown. I ask you, as high-minded legislators, to see if there is not here an opportunity, without doing injustice or injury to anybody, to give to one of the largest cities in the Commonwealth the boon which you have heretofore granted to every other municipality that has asked for it, and to put to a better use that which is now largely wasted, namely : the pure water of the Shawsheen.



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